DEPARTMENT OF COMMERCE

BUREAU OF FISHERIES

HUGH M. SMITH, Commissioner

PACIFIC COD FISHERIES

By JOHN N. COBB

APPENDIX IV TO THE REPORT OF THE U. S. COMMISSIONER OF FISHERIES FOR 1915

Bureau of Fisheries Document No. 830

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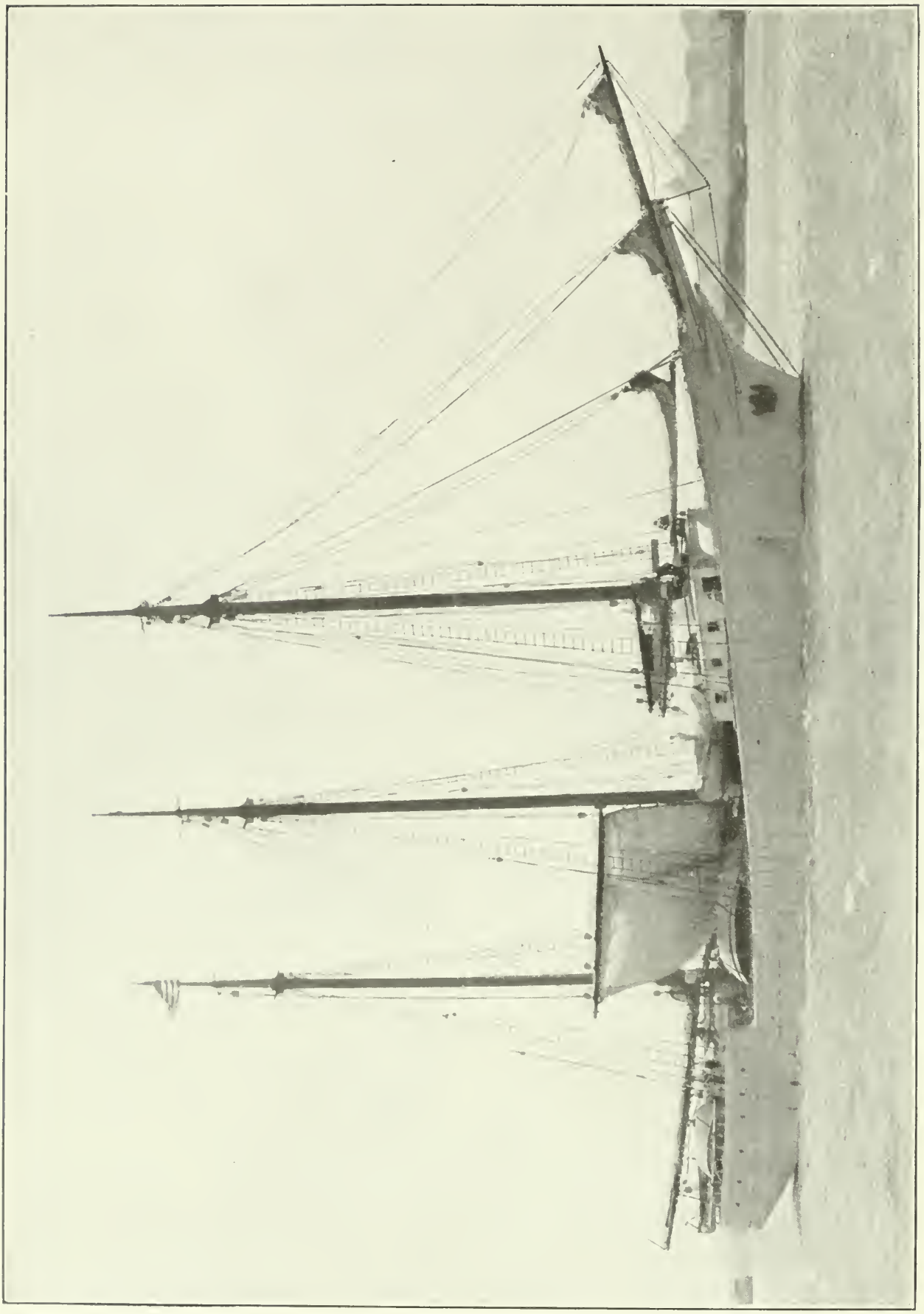

UNION FISH COMPANY'S TRANSPORTING POWER SCHOONER "GOLDEN STATE."

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PACIFIC COD FISHERIES.

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NATURAL HISTORY OF THE COD.

Strange to relate, while the fishery for Pacific cod has been prosecuted since early in the sixties, scientists are not yet agreed as to the proper name for the species. According to Bean[a] "Most writers have referred to it under the name of *Gadus macrocephalus*, which was bestowed by Tilesius upon the Kamchatkan cod, the figure of which suggests that it was based upon a deformed individual. Cope, in 1873, described the young of the common Alaska cod as a new species, *Gadus auratus*, from specimens collected by Prof. George Davidson, of the United States Coast Survey, at Unalaska. Steindachner, in the Proceedings (Sitzungsberichte) of the Vienna Academy, LXI, 1, 1870, adopts the name *G. macrocephalus* for a large cod taken in De Castries Bay (mouth of Amur River), Siberia. In this example the length of the head is contained exactly three times in the total length to the extreme end of the pointed caudal peduncle. The same proportion may, however, be found in any place where large numbers of *Gadus morrhua* are taken, and it can readily be proven to be only a matter of individual variation."

In the summer of 1880, the late Prof. Spencer F. Baird, then United States Commissioner of Fish and Fisheries, sent Dr. Tarleton H. Bean to Alaska for the purpose of investigating its fish and fisheries, and he made the first extended report on the Pacific cod that had been made up to that time.[b] As a result of his investigations, he considers the Atlantic and Pacific cod as of the same species. Jordan and Evermann[c] call it *G. macrocephalus*, and in justification of this state: "In external respects we recognize no distinction between this species [referring to a specimen 20 inches long taken in the Strait of Juan de Fuca by the *Albatross*] and the common eastern codfish, except that the head seems larger." They also quote Dr. Gilbert[d] as follows: "It has been frequently pointed out, and is well

[a] The Cod Fishery of Alaska, by Tarleton H. Bean. The Fisheries and Fishery Industries of the United States, pt. II, sec. 5, vol. I, p. 198, 199.

[b] Ibid., p. 198–226.

[c] The Fishes of North and Middle America, by D. S. Jordan and B. W. Evermann. Bulletin, United States National Museum, no. 47, pt. III, p. 2541, 2542. (1898.)

[d] Ibid., p. 2542.

known to fishermen, that the Pacific codfish has a smaller air bladder or sound than the Atlantic cod. Pending an examination of this question, which we are not now in a position to make, we propose to recognize the Pacific fish as a distinct species."

Much has been said and written of the difference in size between the sound of the Atlantic cod and that of the Pacific. A large part of this is hearsay, based largely on the statements of fishermen, few of whom have ever made any effort to save them. The writer cut out a few sounds in 1913, but, unfortunately, these were lost in some way during transportation; and, although it had been some years since he had cut a sound from an Atlantic cod, it seemed to him that the Pacific sounds were almost, if not quite, as large, but thinner. Some few years ago the Alaska Codfish Co. made an effort to save the sounds at one of its Alaska stations, but the men refused to do so except at an exorbitant price. A. Greenebaum, the president of the company, writes that the sounds are small in size.

The only authentic record the writer has of a direct comparison of Pacific and Atlantic sounds is in a letter from Dr. W. C. Kendall, assistant, United States Bureau of Fisheries, under date of January 22, 1915, in which he states:

> The air bladder of the big Pacific cod [the weight of this was about 30 pounds and its total length about 39 inches], after removal, measured about 13 inches in length, with no perceptible horns excepting slight projections, but it had a very large pouch on each side of the anterior end.
>
> The air bladder of the big Atlantic cod [of a weight of 34¼ pounds and a length of 43½ inches] was of the same length approximately, pouches small, but the horns, which could not be fully straightened out, measured each 10 inches in length. In natural position in the fish they are coiled up.
>
> The small Pacific cod [8 or (9?) pounds and 28⅜ inches long] was in such bad condition that the air bladder could not be removed intact, but the one horn that could be found was only 1 inch in length.
>
> The other Atlantic cod [weights and lengths about the same] had air bladders and horns as follows: Length 9¼, horns 2½ and 3; length 10½, horns 3¼ and 3¼; length 10 inches, horns 7 and 5½ inches.

It is to be hoped that some one will soon take up the study of the comparison of the sounds from the cod of both oceans, as should the Pacific sound prove to be uniformly smaller than those from the Atlantic cod it would furnish a distinguishing feature.

DISTRIBUTION.

The Pacific cod is occasionally found as far south as Cape Flattery on the Washington coast. From Puget Sound north to southeast Alaska they are said to be more common, although in no part of this region is a commercial fishery maintained for them. In southeast Alaska, in early years, a small fishery was maintained in and ad-

jacent to Chatham Strait, but nothing has been done here of recent years. Cod in abundance are not to be found until the Portlock Bank is reached. From here to Akutan Pass cod are very abundant, and probably will be found in considerable abundance along the Aleutian Chain beyond the pass. In Bering Sea, between Unimak Pass and Bristol Bay, are to be found several large and important banks adjacent to Unimak Island and the Peninsula. They have been reported as far north as St. Lawrence Island in Bering Sea, but none have been reported in the Arctic Ocean. Edgar O. Campbell,[a] a school-teacher for the United States Bureau of Education, on St. Lawrence Island, in a letter dated September 21, 1909, has the following to say as to the presence of cod around the island:

> A few codfish feed here and are caught every year from July to October, but not in any appreciable numbers except every third to fifth year. This year promises to be a good one, although the Eskimos are so timid they will not go out for more than a half mile from shore in their skin canoes. Some years the fish stay until in November and great numbers of them are caught by the ice as the sea freezes over. How do you suppose this happens? I have supposed that, as the top of the sea coats over with a slushy soft ice, the cod, for some reason or other, it may be for air, jump up through the ice and fall on the surface, their weight not being sufficient to carry them below into water again. At any rate they soon freeze and, as soon as the ice is solid enough to walk on, the Eskimo bring them home in great piles, like cordwood. This has happened twice since we came in 1901. In such years the fox catch is sure to be light, for the fox are so well fed they are wary of prepared bait.
> * * *

On the Asiatic shore cod have been reported as far north as Cape Tchaplin, East Siberia, while they have been found as far south as Hakodate in Japan. They are most abundant in the Okhotsk Sea.

SIZE.

A very erroneous idea of the size of Pacific cod seems to be prevalent in certain works on ichthyology. Even as late as 1907 Evermann and Goldsborough[b] state: "We have no record of any large examples of this cod from the Pacific, where it perhaps does not reach a weight exceeding 15 or 20 pounds." Bean[c] reports having seen many which weighed not less than 30 pounds caught on the inshore banks, where the cod are notably smaller than those found on the offshore banks. He also quotes reports from others as to cod weighing from 20 to 50 pounds.

The writer spent the summer of 1913 at the Pirate Cove station of the Union Fish Co. During the greater part of the time almost no

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[a] Mr. Campbell had written for information as to how the natives could best catch cod for their own use.

[b] The Fishes of Alaska, by B. W. Evermann and E. L. Goldsborough. Bulletin, United States Bureau of Fisheries, vol. xxvi, 1906, p. 348. (1907.)

[c] The cod fishery of Alaska, by Tarleton H. Bean. The Fisheries and Fishery Industries of the United States, pt. II, sec. 5, vol. I, p. 202, 203.

snappers were to be seen and the fish averaged very large—probably 12 to 15 pounds most of the time. On June 15 he weighed 6 cod, selected so as to show the different sizes, with the following results: One weighed 40 pounds, length 43 inches from tip to tip; one weighed 37 pounds, length 42½ inches from tip to tip; one weighed 22 pounds; one weighed 21 pounds, length 39 inches from tip to tip; one weighed 23½ pounds; one weighed 11½ pounds, length 31 inches from tip to tip.

He had the first fish dressed immediately after being weighed and measured, and when ready for the salting tank it weighed 21 pounds. Before being weighed in the first place all of these fish had been bled by having their throats cut.

On a number of occasions he saw fish at the shore stations which would undoubtedly run over 40 pounds if put on the scales. All of the fish noted above were from inshore banks. Cod run larger in size on the offshore banks, and it is probable that fish running from 50 to 60 pounds are sometimes taken on Slime and Sannak Banks, where the largest cod are found.

During the winter months the cod are quite thin and watery, and probably would not average in the round much more than 7 to 9 pounds.

There are no records of any monster specimens having been secured on the Pacific banks, similar to those reported occasionally from the Atlantic. Capt. J. A. Matheson, of Anacortes, Wash., who has been engaged in the cod fishery for a number of years, says that the largest dry-salted cod he ever received from his vessels weighed 18 pounds.

In the southern part of its range the cod are generally small, in many places being no larger than those known as snappers on the cod banks.

MIGRATIONS.

On the main cod banks fish are to be found throughout the year, although very scarce at times. On certain of the inshore banks cod are to be found all the year in considerable abundance, with periods of great abundance; on other inshore banks only during the winter months are the fish found in any abundance, while on others they are plentiful only during the summer months. Pirate Cove, Unga, and Kelleys Rock are all-the-year-round stations, the Sannak Island and Northwest Harbor stations are all-winter ones, while Sanborn and Dora Harbors are open only during the summer months. At the stations open the whole year the best fishing is usually from March to September, both inclusive. Part of this superiority is undoubtedly due to the better weather which prevails during these months than during the rest of the year, but the reports and statistics all agree in showing that there is a greater shoreward migration of the schools during this period.

SPAWNING.

Cod are found spawning during the winter months, principally in January and February. Those caught during February and March and the early part of April are usually quite thin, due to their having spawned shortly before this.

In many females the eggs are not extruded at the regular period, and in many instances these eventually harden into an almost solid mass. At Pirate Cove, in 1913, the author's attention was early called to these delayed spawners. The first one was observed on May 10, shortly after his arrival at the station. From then on they occasionally appeared until early in August, when they became quite numerous. On June 25 he cut out of one female a roe which weighed 8 pounds. Occasionally the eggs would be found in a mass with the usual envelope missing. In no instance that he observed did this condition seem to affect the health of the fish, all of them appearing to be normal fish so far as food qualities, weight, etc., were concerned.

YOUNG.

Dr. Bean's observations showed young cod as present in shallow water near shore at some place or other on the Pacific side between Cooks Inlet and Unalaska between May and October, and that about the middle of the latter month they reach an average length of 4 or 5 inches.

On September 7, 1913, the writer first noticed large numbers of young cod from 2 to 4 inches in length swimming around Pirate Cove harbor, and they were still there in large numbers when he left on September 26. The small native boys would occasionally catch them on a baited hook or bent pin, which the fry would eagerly pursue. They were also occasionally found in the stomachs of adults brought in by the fishermen, showing conclusively that the cod do not discriminate against their own offspring.

FOOD.

The food of the Pacific cod is as plentiful and as varied as in the Atlantic. Any fish that it can capture forms a part of its food. The writer opened and examined the stomachs of many cod at Pirate Cove station during the summers of 1912 and 1913, and he was surprised at the variety of food found therein. During July, 1913, shrimp were exceedingly abundant in their stomachs. He also found three ducks with bright red feet, known locally as "Alaska pigeons," these had evidently been swallowed but a short time before, as they were all in an excellent state of preservation. Alaska pollock (*Theragra chalcogramma*) seemed to be the chief food of the cod, although, strange to

relate, it was found to be absolutely worthless as bait when cut into pieces. Sculpins are frequently found in its stomach, as are also salmon, herring (*Clupea pallasi*), capelin, halibut, and sand launce (*Ammodytes personatus*). Yellow striped fish, or "Atka mackerel" (*Pleurogrammus monopterygius*), is a popular article of food when in season. The male red rock trout (*Hexagrammos superciliosus*), which has greenish colored flesh and is given the common name of "porgy" by the fishermen, is a favorite article of food. Sometimes young cod are found in the stomachs of the adults. Octopi and shrimp are favorites of the cod, and during the summer months their stomachs will be found, in certain sections, to be filled with the latter.

OTHER MEMBERS OF THE GADIDÆ.

An odd feature of the cod fisheries of the Pacific is the total absence of the haddock and hake, which form such a large proportion of the catch of the Atlantic Gadidæ fishery. The pollock of Alaska is quite different from the one found on the Atlantic. The minor species of the Gadidæ found on this coast are described below.

Ling.—The ling (*Lota maculosa*) is our only fresh-water member of the Gadidæ, and is said to be common in the Yukon Basin, and has also been reported from the Nushagak, Fraser, and Columbia Rivers. It attains a length of 1 to 3 feet. Although fully as palatable as the ling found in east-coast streams, it is rarely utilized as food, except in British Columbia and Washington, where large quantities are marketed.

Tomcod.—The tomcod, or wachna (*Microgadus proximus*), is found in abundance from Alaska to Monterey. In the more southern portions of its range it is often sold in the markets as "smelt." In form the tomcod is a miniature cod, and there is difficulty in distinguishing the young of the two species. The tomcod rarely exceeds a foot in length and is esteemed as a delicacy in many localities.

In the northern portion of Bering Sea the wachna, as it is called, is of great importance to the natives, who depend upon it for a considerable part of their food supply during the winter season. Mr. Dall[a] has the following to say of this fishery:

> This fish much resembles the common tomcod of the Eastern States, * * * but while the latter is of most insignificant importance from its scarcity and poor quality, the former species occupies a very important place in the domestic economy of both natives and Russians on both shores of Bering Sea. It is apparently a permanent inhabitant of these coasts, but is most abundant in the fall of the year, when the ice begins to form in the rivers and along the shores. The Waukhni fishery commences about the middle of October. At first it is caught from boats anchored close inshore, but later the natives cut holes

[a] Report of Commissioner of Agriculture for 1870, p. 381. (1871.)

in the new ice, set up two or three stakes, with a mat hung upon them to keep off the wind, and sit there all day, hauling them in as fast as the line is dropped into the water. The hook is made of white walrus ivory, furnished with a sharp pin set in obliquely, but without a barb. The whiteness of the ivory, which is kept constantly in motion, attracts the fish, but no bait whatever is used. In November, when the ice becomes very thick and the cold increases, the fish retire to deeper water, and the fishing is over until the following spring. * * * They are preserved by removing the intestines and drying in large bunches strung on seal line, or by throwing them as they are into long cylindrical baskets made of twisted grass and keeping them entire in a frozen state. * * * They are among the most palatable of the many fish found in these seas, and the number preserved is so great as to be almost incalculable. They serve the natives for food, either boiled or in the frozen state. They also form an important article of dog feed in the northern portions of Alaska near the coast.

Hon. James Wickersham, Delegate from Alaska, has furnished the author with the following description of the apparatus used by the natives and their method of operating same of recent years:

When the Eskimo woman is fishing through the ice on Bering Sea for tomcod she uses a line with a barbless hook at the end. She also has two short sticks in her hands and generally a baby strapped on her back. As soon as she gets a bite she slips one stick a foot or two down the line and begins raising it up. As soon as the stick gets too high she slips the other a few feet below the first, but on the other side of the line, and thus continues hauling in the line with the sticks alternately until finally the catch comes above the ice. With a quick movement of the line and stick the fish is shook off, and frequently before it falls onto the ice is frozen solid. The woman is wearing heavy gloves, and the reason for not touching the wet line with the gloved hands is to prevent them from getting wet and covered with ice and thus becoming useless. The line is lowered in the same manner, and from long practice the natives are very expert. The fish are put in baskets and will keep fresh as long as they remain frozen. A windbreak of ice and snow is frequently constructed.

Alaska pollock.—The Alaska pollock (*Theragra chalcogramma*) is an abundant and widely distributed species in Alaska. It is found in the Bering Sea and the neighboring waters south to Sitka and the Kurils. It usually swims near the surface and forms a considerable portion of the food of the fur seal and the cod. It reaches a length of 3 feet, although the average is more nearly about half this. At present no use is made of it as food, although it will in time become an important item in the commercial fisheries. In 1907 the writer caught a specimen at Seward, Alaska, but it was apparently so rare in that locality that no one there seemed to recognize it.

South of Sitka is found a closely related species, *T. fucensis*, which is said to be abundant in Puget Sound, and is found as far south as Monterey Bay.

Eleginus navaga is common and abundant along the entire Alaska coast, and on the Asiatic side as far south as the Kamchatka Peninsula, at least. It is rarely ever used as food, due to the great abundance of other better-known fishes.

Polar cod.—The polar cod (*Boreogadus saida*) is common along the coasts of Arctic Alaska and northern Siberia. Like the pollock, this species has the lower jaw longer than the upper. They form an important article of food with the Eskimos during certain seasons of the year. John Murdoch[a] has the following description of the fishery:

> Usually during the latter part of October and early in November, after the sea has closed and when tide-cracks form along the shore, the natives generally catch a good many of them at the very edge of the beach in about a foot of water.
>
> They use a short line of whalebone to which is attached a small lure made of blackened ivory, which roughly represents an amphipod crustacean and is armed with a barbless hook.
>
> After this no more are caught till after the return of the sun, early in February. The natives say that they go away, and it is quite probable that they leave the shore and go off into deeper water. If there were any fish to be caught, the natives would undoubtedly fish for them during the winter months, as at this season they are frequently hard pressed for food.
>
> Early in February they become exceedingly abundant in about 15 fathoms of water wherever there is a level field of the season's ice not over 4 feet in thickness, inclosed between rows of hummocks of broken ice. * * * Large numbers of the natives from the Cape Smythe village, especially women and children, resorted to this field nearly every day and caught these fish literally by the bushel.
>
> The fish are jigged and the hook is kept near the bottom.

SPECIES MISCALLED COD.

A confusing feature on the Pacific coast is the number of species, unrelated to the Gadidæ and none of which resemble the true cod, which are commonly known as cod and which are frequently classed with the cod by the uninitiated. Among these the more prominent are the following: Cultus cod, blue cod, or buffalo cod (*Ophiodon elongatus*), is a large, coarse fish reaching a length of 3 to 4 feet, and a weight of 30 or 40 pounds, with the flesh a livid blue or green in color. It is found from Sitka to Santa Barbara, and is especially important as a food fish in British Columbia and the State of Washington. In cooking, the flesh of this fish turns white.

Black cod, coalfish, beshow, or skill (*Anoplopoma fimbria*), is found from the Aleutian Islands to Monterey. It is most abundant in the regions frequented by the halibut, from southeast Alaska to the Washington coast. It attains a length of 18 to 20 inches and a weight of 5 pounds. Many are marketed in a fresh, frozen, or salted condition, and the fish is growing steadily in popularity. It is usually taken in deep water, from 70 to 90 fathoms, though it is often found even at depths of 200 to 250 fathoms.

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[a] Natural History, Report of the International Polar Expedition to Point Barrow, Alaska, Fishes, p. 129–30. (1885.)

Several species of Sebastodes (notably *S. ruberrimus*, *S. pinniger*, and *S. mystinus*), known as red rock cod, are found from San Diego to Alaska. They are excellent food fishes and are in considerable demand.

BANKS FREQUENTED BY COD.

The codfishing banks are of two kinds—the inshore banks, which lie close in to shore, or in the bays, straits, and sounds between the numerous islands and the mainland and between the islands themselves, and the outer banks, which lie at varying distances off the mainland or the various groups of islands. Together they form by far the largest group of cod banks in the world.

Outside of the surveys made by the United States Bureau of Fisheries steamer *Albatross*, very little has been done to fix with certainty the boundaries of the various banks and much remains to be accomplished in this line. The *Albatross* survey has been supplemented by data obtained from fishermen frequenting these banks and from personal observation over a period comprising several fishing seasons.

According to the investigations of the *Albatross*, the following represent, roughly, the areas of the offshore banks upon which she worked, although in several instances the work was suspended before the end of the bank was reached:

	Sq. miles.
Slime Bank	1,445
Baird Bank	9,200
Between Ugomak Island and Kiliuluk Bay, in the Pacific Ocean	2,000
Davidson Bank	1,600
Sannak Bank	1,300
Between Sannak and Shumagin Banks	1,800
Shumagin Bank	1,800
Albatross Bank	3,700
Portlock Bank	6,800
Total	29,645

Practically no attempt was made by the *Albatross* to seek for cod banks along the Aleutian Chain west of Akutan Pass, where cod are said to be numerous. Also no attempt was made to find banks in Bering Sea north of Cape Newenham, although cod have been found as far north as St. Lawrence Island.

No estimate has ever been made of the extent of the inshore banks, which are very extensive. It is probable that these would be from one-third to one-half the area of the offshore banks, possibly more.

No one knows the extent of the cod banks along the Asiatic shores of the Pacific Ocean, but they can not be much smaller, if any, than those on the American side, and it is possible that more extended investigations will develop that they meet the American banks at certain places.

OFFSHORE BANKS IN BERING SEA.

Owing to a lack of good harbors in Bering Sea, the offshore banks are the only ones frequented at present by the fishing vessels, and these are amongst the most productive in all Alaska. As the holding ground on these banks is good, a properly equipped vessel finds little difficulty in riding out all ordinary gales. All cod banks so far found are mostly situated to the eastward of a line connecting Cape Newenham with the northwest cape of Unimak Island and off the northern side of Unalaska Island.

Slime Bank.—The first cod bank to be reached by a fishing vessel after entering Bering Sea is Slime Bank. As delineated by the *Albatross*, it begins directly off Cape Sarichef, the northwest cape of Unimak Island, is elongate in shape, and follows approximately the trend of the adjacent coast to within a few miles of Amak Island, its inner margin lying only a short distance off the land. It is about 85 miles in length and 17 miles in average width, broadening somewhat at the eastern end; its total area is estimated at about 1,445 square miles. The depths found on the bank range from 20 to 50 fathoms, while the bottom consists generally of black sand and gravel, frequently intermingled with pebbles, and sometimes of gray and yellow sand, rocks also occurring near the shore.

The deep water lying off the northern entrance to Unimak Pass forms the western end of the bank, 70 fathoms being found near the edge and depths exceeding 100 fathoms a short distance farther away. Off its northern edge the depths determined by the soundings of the *Albatross* range from 53 to 62 fathoms, with muddy bottom at three of them. Toward the eastern end, however, on the northern side sand and gravel occur, and in this locality the precise limits of the bank are still undefined.

There are no harbors suitable for cod vessels along the adjacent shore, although protection may be found in several bays, notably Dublin and Shaw Bays, during southeast to southwest winds. Amak Island, which lies about 11 miles off Izenbeck Bay, also furnishes some protection during the prevalence of southeast and southwest winds.

The bank derives its name from the presence of immense numbers of a large jellyfish, brownish or rusty in color, measuring 6 to 18 inches across the disk, and provided with long slender tentacles having great stinging powers. It is said by the fishermen that the jellyfish are never observed upon the surface of the sea, but seem to occupy an intermediate zone toward the bottom. They claim that these animals sometimes interfere with the hooks reaching bottom, and by covering the bait render it unattractive to the fish. When brought to the surface they are uncomfortable objects for the fishermen to disentangle from the hook and line. They do not become

abundant until the latter part of June, when the fishermen generally move on to Baird Bank.

Probably the finest cod secured on any of the Alaska banks are taken on Slime Bank.

Baird Bank.—Baird Bank, so named by Capt. Tanner of the *Albatross* in honor of Prof. Spencer F. Baird, the first United States Commissioner of Fish and Fisheries, was then generally known to the fishermen, and is yet to a few of them, as the Port Moller bank or ground. As described and charted by the *Albatross*, it commences a few miles east of Amak Island and extends northeastward off the northern side of the Alaska Peninsula to the vicinity of Cape Chichagof, at the mouth of the Ugaguk River, a distance of about 230 miles. It has an average width of about 40 miles and an extreme width of 58 miles, its total area being estimated at about 9,200 square miles, making it the largest known bank in Alaska, and some 800 miles more than that of Georges Bank, in the North Atlantic Ocean.

The *Albatross* investigations indicated, however, a strong probability that the Kululak ground and the region off Cape Pierce are really extensions of this bank, the investigations not having been carried to a definite conclusion with respect to this matter. Outside of Bristol Bay the observations were not carried beyond the limits of the bank as defined by the *Albatross*, and the entire width of its western portion still remains to be determined. It is also not impossible, according to Capt. Tanner, that some connection may be found to exist between Baird and Slime Banks to the north of Amak Island. A line of stations from Cape Newenham to the Northwest Cape of Unimak Island, however, showed good fishing only in the vicinity of land.

Like Slime Bank, but few harbors are to be found along the shores adjacent to Baird Bank. Vessels occasionally take refuge in Port Moller, Herendeen Bay, and Port Heiden, but usually the vessels ride out the storms or draw in close to the peninsula shore during southeast winds.

Kululak Bay.—Kululak Bay occupies a large part of the region included between Cape Constantine and Cape Newenham and contains Hagemeister Island and the Walrus Group. Within this area the *Albatross* investigators found cod in isolated spots, scarcely entitled to the name of banks. Extensive shoals occur off Hagemeister and the Walrus Islands, 6 fathoms being found about 15 miles to the southward of the latter. The principal fishing grounds are outside of these shoals as well as to the eastward and westward of them, in depths of 12 to 25 fathoms, the bottom consisting generally of sand, with some mud and gravel, and the fauna being essentially the same as on Baird and Slime Banks.

Some years ago the fishermen occasionally resorted to a small ground, called Gravel Bank, situated about 16 miles south-southwest from the southern end of Hagemeister Island, where large cod are reported to be abundant. It has depths of 16 to 20 fathoms, but its size is inconsiderable.

Vessels entering Bering Sea fish first on Slime Bank, usually in or just off Dublin Bay. From here they work to the eastward, leaving for Baird Bank when the jellyfish become too numerous on Slime Bank. No fishing is now carried on in the Kululak ground.

The *Albatross* investigations were not carried north of Cape Newenham; cod have been reported at various places between here and Bering Strait and in the Arctic. They are said to be abundant in the neighborhood of St. Lawrence Island.

OFFSHORE BANKS IN THE NORTH PACIFIC OCEAN.

The *Albatross* ran three lines of soundings over the area lying between the longitude of Ugamok Island, at the southern entrance to Unimak Pass, and that of Kiliuluk Bay (longitude 164° 55′ to 167° west) and between the coast and the inner edge of the steep submarine slope. These soundings were not sufficient to demonstrate the existence of a defined bank in this region, but it was estimated that an area of about 2,000 square geographical miles was suitable for fishing. This has been borne out by the experiences of a number of fishing vessels which have made good catches at certain places in this area on various occasions.

Even farther to the westward occasional trials have been made by cod vessels, when becalmed inside the 100-fathom curve or when seeking water, and good catches of cod made.

Davidson Bank.—This bank was first reported by Prof. George Davidson, of the United States Coast Survey, about 1868, and was named in his honor. He made a number of soundings upon it in depths of about 50 fathoms and found cod abundant in some places. In 1888 the *Albatross* established the outline and surface contour of this bank with considerable accuracy.

The bank lies south of Unimak Island and extends westward from the neighborhood of the Sannak Islands to about the longitude of the southern entrance to Unimak Pass (about longitude 164° 40′ west). Its eastern end seems to be continuous with the shoal water surrounding the Sannak Islands. The greatest width of this bank off Unimak Island is 45 to 50 miles. Depths less than 50 fathoms were found over a large part of the bank, 41 fathoms being the shoalest water discovered. Between the shallow area and the islands

to the north and northwest of it depths of 50 to 72 fathoms occur. The area of Davidson Bank is estimated at about 1,600 square miles.

The bottom upon the bank consists, in different places, of fine to coarse sand, pebbles, and gravel. Green mud is found at a depth of 95 fathoms near the outer edge of the bank and black sand in 342 fathoms just off the bank.

Sannak Bank.—The principal bank resorted to by the few vessels which fish throughout the season in the North Pacific is Sannak Bank. This bank lies to the east and southeast of the Sannak Islands, is somewhat elongate in shape, and trends in a general way northeast and southwest. About the central spot on the bank is in latitude 54° 20′ north, longitude 161° 53′ west. To the westward it joins Davidson Bank, the dividing line being at a point approximately south of the middle of the group. The soundings on this bank show depths from 30 to 82 fathoms. Much of the bottom is rocky; sand, pebbles, gravel, etc., also occur. The estimated area of the bank is 1,300 square miles.

The cod taken on this bank are very large and of excellent quality, and are the finest fish taken on any of the Alaska banks with the exception of those from Slime Bank in Bering Sea.

To the mariner unacquainted with these waters this is a dangerous region, but to one acquainted harbors of refuge are numerous. Caton Harbor, formed by Caton, Elma, and Sannak Islands, is the chief place of refuge for the larger vessels, as it is easy to get into from either the northern or southwestern entrance, and when inside there is excellent holding ground and ample protection from all winds. Small vessels, especially power vessels, in case of storm generally anchor close in to the leeward of Caton Island and are safe. On the northern side of Sannak Island vessels drawing 14 and 15 feet can easily enter Pavlof Harbor at high tide, but at low tide vessels drawing more than 6 feet would have difficulty in entering. The channel is rather tortuous but is buoyed. Inside the anchorage is rather limited, as the harbor is small. The Union Fish Co. has a large station here, and vessels can lie alongside the dock at all stages of the tide, large ones usually resting easily in the mud at low tide. Johnsons Harbor, where there is another station of the same company, can be entered at any stage of the tide, the entrance being unusually free from obstructions, but the harbor is so shoal throughout the greater portion that the vessel anchorage is largely restricted to the western part, a little inside the entrance. Farther to the westward are Moffets Cove and Company Harbor, on both of which are shore stations of the Alaska Codfish Co., and which are available to all cod-fishing vessels at high tide.

When fishing on this bank the larger vessels generally ride out storms. When the vessel begins to drag the anchor is usually buoyed and the vessel either puts to sea or goes to Caton Harbor.

Between Sannak Bank and the beginning of the Shumagin Bank to the eastward lies a large area of comparatively shoal water, over the greater part of which cod are to be found in varying abundance, although this ground is not much frequented, owing to the absence of convenient safe harbors in its western half, and the presence of the dangerous Sandman Reefs to the northwest. In the eastern portion vessels can easily find shelter among the Shumagin Islands. A few vessels occasionally fish for a short portion of the season in this region. This area shows depths of 38 to 74 fathoms and is, roughly, about 1,800 square miles in extent. The bottom is exceedingly variable, consisting in different places of sand, mud, pebbles, gravel, and rocks, the latter occurring only near Sannak Bank on the one side and near the Shumagin Islands on the other.

Shumagin Bank.—Shumagin Bank lies to the south and southeast of the Shumagin Islands, with its outer margin following approximately the trend of the coast line formed by the adjacent islands. On the westward the bank has been traced to about longitude 159° 52′ west, but undoubtedly extends farther in this direction. East of the Shumagin Islands it reaches north to the latitude of the upper end of Big Koniuji Island. Its width within the 100-fathom curve to the south of the group varies from 15 to 35 miles to the nearest outlying island, while its area has been estimated at about 1,800 square miles. The depths over a large part of the bank are less than 50 fathoms, the bank not being separated from the islands by deep water. The character of the bottom on the bank varies greatly, sand, pebbles, gravel, broken shells, mud, and rocks being found in different places. Rocky patches are of frequent occurrence, even in comparatively deep water. These rocky patches are a grave source of danger to vessels anchored on the bank, as they chafe and break rope cables. The schooner *Vega* fished on this bank, to the south of Simeonofski Island, in 1913 and 1914, and was compelled to use a couple of shots of chain next to the anchor in the latter year, having lost an anchor the previous year because a rope cable was employed. Owing to this danger and the strong tides, few vessels have ever made a practice of fishing on this bank, although the fish rank in quality next to those caught on the Sannak Bank.

The area between the Shumagin Islands and Kodiak is very imperfectly known, largely because the fishing vessels do not frequent it, preferring to visit the better-known banks. The *Albatross* (in 1888) ran a single series of soundings across this wide area, with a double line extending from the neighborhood of Lighthouse Rocks

to Mitrofania Bay. These showed on the single-line depths of 26 to 137 fathoms, while the double line showed depths of 44 to 73 fathoms.

Albatross Bank.—This bank lies off the southeastern side of Kodiak Island and extends the entire length of that island as well as in front of the Trinity Islands. At the eastern end it is practically continuous with Portlock Bank. Along some portions of the coast, as in the neighborhood of Sitkalidak Island, the bank is separated from the land by comparatively deep water, while in other places shoal water intervenes. The 100-fathom curve is distant 25 to 45 miles from the land, inside of which limit there is an estimated area of 3,700 square miles. Depths from 40 to 60 fathoms are most common on the bank. Beyond the 100-fathom line the slope is very abrupt. All varieties of bottoms occur, sand being most prevalent, and rocky patches common.

Prof. George Davidson, one of the earliest investigators of the fishing banks off this portion of the Alaska coast, predicted the existence of this bank upon the evidence of a few isolated soundings. The bank was later named after the *Albatross*, which surveyed it.

In the early years of this industry this bank was frequented by small vessels with headquarters at Kodiak, but as most of the fish taken are smaller than on the other offshore banks, it has not been much resorted to in recent years.

Portlock Bank.—Portlock Bank extends northeastward from Kodiak Island to about longitude 148° 30′ west, a distance of 110 to 120 miles, and is widest at the western end. Its outline, as indicated by the 100-fathom curve, is irregular. It is the largest single bank south of the Alaska Peninsula, its area inside of the 100-fathom curve being about 6,800 square miles. The boundaries of this bank have not been conclusively established as yet, and it may eventually turn out to be much larger than supposed. No soundings were made by the *Albatross* nearer than 16 miles south of the Kenai Peninsula. Between longitudes 150° and 151° west the bank abruptly narrows, and thence maintains a width of 35 to 45 miles to its eastern end. There is a broad indentation, with depths of 102 to 166 fathoms, on the southern side; depths of 105 to 122 fathoms occur just off the northern border, and 106 to 761 fathoms off the eastern end, close to the 100-fathom curve.

The soundings made by the *Albatross* between longitude 150° west and the eastern end of the bank, inside of the 100-fathom line, show depths of 66 to 99 fathoms. Near the central part of the bank, between longitudes 150° and 151° west, two soundings of 37 fathoms occur, while on the southern part depths of 40 to 72 fathoms were found. Between longitudes 151° and 152° west, the latter marking approximately the western boundary of the bank and the coast line,

the depths, according to the soundings of the *Albatross*, range from 20 to 81 fathoms, the latter occurring near the land; but there were no indications of a marked or extensive depression between the bank and the shore.

Gray sand prevails over most of the bottom, mixed with pebbles, gravel, and broken shells in places, with occasional patches of mud and some rocky spots on the western part of the bank.

In 1888 the *Albatross* made a single series of soundings between the eastern end of Portlock Bank and Middleton Island, which showed depths of 87 and 101 fathoms about midway between the two, indicating a small area surrounded by much deeper water.

In 1911 the *Albatross* covered this same region more extensively in its search for halibut banks, but on neither occasion were cod found.

During the latter investigations the region between Middleton Island and Dixon Entrance was covered by the *Albatross*, but only an occasional cod was found, and the work of the halibut vessels over this area indicates that cod are quite scarce.

INSHORE BANKS.

These banks are generally close to shore, usually around islands, and are the ones resorted to by the fishermen from shore stations adjacent, from whence the cured product is shipped to market, or by the natives and whites living close by, who catch enough for their immediate wants or cure a few for their food in winter. Observations at a number of places show that cod caught close to the mainland shores are generally smaller than those found on the offshore and the island inshore banks. Practically no cod are taken for market on the inshore mainland banks.

It was noticed that cod in a sick condition generally sought the shelter of the harbors. At Pirate Cove, in the Shumagins, and at Pavlof, on Sannak Island, the writer frequently noticed medium-sized cod in the harbors, and almost invariably these were found to be sick or diseased. A few yards outside the harbors only clean, healthy fish would be found, thus showing that their condition caused the diseased fish to seek the shelter of the harbor.

There are a few small banks in southeast Alaska. These banks, which vary from 5 to 7 fathoms in depth, are mainly in Chatham Straits, Lynn Canal, and Icy Straits. The fish are found on the banks in the summer, disappearing into the deeper water in the fall. The fish caught are comparatively small, examples more than 24 inches in length being rare.

Although cod are occasionally found near Sitka, Yakutat, in Prince William Sound, and Port Graham, near the lower end of the

Kenai Peninsula, but few are ever taken by fishermen. At one time considerable cod were taken by the natives living on Kodiak, Afognak, and adjacent islands, but of late years the natives have devoted most of their time to the salmon fishery. The fact that the cod found on these banks are quite small has militated heavily against their sale in a dry-salted condition, in which trade only large fish are of much value. In 1909 the Alaska Commercial Co., at its Kodiak station, purchased from the native fishermen and dry-salted a considerable quantity of cod, but they were so small that they could be marketed in San Francisco only at a loss, with the result that the fishery was abandoned. If these small fish had been pickled they would have found a small but growing market for them in the coast States.

In Chignik Bay cod are frequently found. At Mitrofania the natives cure considerable quantities for their own use, while in 1912 some stockfish was prepared by a number of the natives. In 1912 the writer investigated the ground off Ivanof Bay. Good, large cod are to be found here, but the vessels have never found it necessary to resort to this ground, while a shore station could not operate, as, should the wind from the ocean suddenly shift to the land, a dory would be blown straight out to sea. A vessel would find Kupreanof Harbor a very safe and convenient refuge.

On Herendeen Island, on Northwest Harbor, a small island to the northward of Little Koniuji Island, are located two shore stations, which are operated during the winter and spring months; during the last two seasons with but indifferent success. During the summer months the cod are mostly on the offshore banks, too far away for the dories to operate. Several vessels have operated with marked success on this offshore bank, which is really a prolongation of Shumagin Bank, but as the bottom is rocky anchors are frequently lost.

In the Shumagin and Sannak Groups shore stations to operate on the inshore banks have reached their greatest development.

In the Shumagins these banks are very numerous, spots where cod can not be taken at some time during the year being exceedingly infrequent. The best-known banks are in West Nagai Strait and Gorman Strait. The majority of the Shumagin Island stations are on the former sheet of water, it forming practically one continuous bank. On the western side fishing is carried on throughout the year, while on the eastern side fishing is generally begun in May and ended in August—June and July being the best months. The stations on the western side find the cod most abundant from March to October, the former month being the best. It is probable that they are just as abundant during the rest of the year, but the weather generally prevents much fishing. A considerable part of this bank,

lying throughout the middle of the strait, has been but little fished, as the dories could not work that far from shore. During the last two years, however, the number of power fishing boats has been considerably increased, and as these are enabled to go much farther from shore than the dories which are propelled by oars or sails, the middle ground is being worked more thoroughly. Occasionally the smaller vessels, with headquarters at the stations, have frequented the outer banks in West Nagai Strait. Around the Haystacks is an especially good fishing ground for a power fishing vessel. This ground runs from the pinnacle off East Head and the eastern point of Porpoise Harbor north to the southeast end of Andronica Island; is also said to extend toward Wedge Cape, at the upper end of Nagai Island. The bottom on this ground is smooth, and is composed of fine hard gravel; depth of water about 30 fathoms. The strong tide and the proximity of the numerous small islets forming part of the group make a power vessel necessary.

Should otter trawling ever be adopted for codfishing, West Nagai Strait would be one of the most favorable spots in all Alaska for its operation, as it has a comparatively smooth sandy bottom with depths throughout the greater portion from 25 to 40 fathoms.

Pirate Cove, the oldest shore-fishing station operated in Alaska, is located on the northeast point of Popof Island. The grounds frequented by the fishermen of this place lie in Gorman Strait, between Popof and Korovin Islands, and along the eastern side of the island as far south as Popof Head.

In Unga Strait an inshore bank begins at Gull Island in 40 fathoms, and runs west to Bay Point (known locally as Niggerhead). The bank is about a mile offshore and is about a mile in width, with a depth of about 30 fathoms nearly everywhere. Bottom is of packed sand with very little moss.

In Portage Bay (now known as Balboa Bay) is a small bank upon which large fish may be taken during the summer months. The bank runs up the middle of the bay to the 5-fathom sounding. The soundings on the bank run from 25 to 35 fathoms. The bottom is of gravel, with numerous holes.

In Beaver Bay, along the Peninsula, good fishing may be had. The bottom here is sandy and the depth averages about 25 fathoms.

On the northern, eastern, and western shores of the Sannak Islands are to be found inshore banks on which cod are to be found throughout the late fall and winter, but the fish are in too deep water for the station fishermen throughout the rest of the year. On the northern side are four shore stations. Owing to the danger of the fishermen being blown to sea in the gales which spring up very suddenly in this region, no shore stations have been established on the south side.

Along the shore of Unimak Island, from Cape Pankof to Cape Lutke, codfish used to be quite numerous during the summer months. This ground is really the inshore portion of Davidson Bank. At Dora Harbor, on the south side of Ikatan Peninsula, Unimak Island, are located two shore stations, and the fishermen from these fish out around Bird Island. For a year or two after the stations were opened they made big catches, but after that they dwindled until about 50,000 fish now represent the combined catches. Several schooners usually fish on the main ground a few miles offshore during the spring months, off Cape Pankof being a favorite spot.

Just off Akutan Harbor, on Akutan Bay, cod are said to be abundant. While the schooner *Vega*, of Seattle, was taking aboard water in the harbor late in June, 1911, her fishermen, hand-lining from dories around the mouth of the harbor, caught 1,500 cod on one day and 2,700 the day following. The *Albatross* investigations in the same year showed that cod were abundant and quite large close inshore off North Head, Akutan Island.

The *Albatross* investigations showed that cod were abundant directly off Chernoffsky Bay, on the Bering Sea side of Unalaska Island, during the summer, and it is very probable that investigation will some day disclose many other inshore banks at various places along the Aleutian Islands where cod can be caught at all or some seasons of the year.

But little is known of the inshore banks on the north side of the Alaska Peninsula, mainly because, owing to the lack of safe and convenient harbors adjacent to the banks, shore stations can not be operated.

BANKS ON THE ASIATIC SHORE.

But little is known of the extent of the cod banks along the Siberian coast, as no detailed or even sectional surveys have been made of them. Our own vessels have done more toward showing their extent and productiveness than those of any other nation. The principal banks lie in the Okhotsk Sea and the Asiatic side of Bering Sea. How far north the fish range is still undetermined, but it is probable that they will be found about as far north on the Asiatic shore of Bering Sea as they are on the American shore; that is, to St. Lawrence Island. They are said to be found as far south as Chosen (Korea) and northern Japan.

HISTORY OF THE PACIFIC CODFISHERY.

The history of the Pacific codfishery is a record of the strenuous struggle of a few individuals and companies against its giant brother on the Atlantic coast, which, backed by great wealth, the prestige and advantage gained by years of unopposed command of the Amer-

ican markets, an almost unlimited supply of raw product, and dur ing the last two seasons the ability to import from the eastern Prov inces of Canada large supplies free of all duty, has had an immens advantage over its younger and weaker brother. On this coast i has not been a question of being able to secure cargoes, but has bee one of finding a market for the catch; a vastly greater catch coul be made were a market available for it.

The fact of the presence of cod in Alaskan waters has long bee known. In the speech of Hon. Charles Sumner,[a] on the cession o Russian America to the United States, and which had such a power ful effect in favor of the treaty of cession then pending, is an ab stract of the references made by early navigators and visitors ir Alaska to its fishes. The first mention was made by a Russian navigator in 1765, who reported "cod, perch, pilchards, smelts," as being found around the Fox Islands. Other navigators and ex plorers who reported the presence of cod were Cook (1786), Port lock (1787), Meares, Billings (1792), Langsdorf (1804), Sutke, and Sir George Simpson (1841), all of whom speak of it as being a very common fish. But little use was made of it, however, owing to the abundance of salmon.

It is reported that in 1866 two or three small schooners fitted out at Victoria, British Columbia, and fished with fair success on the grounds immediately north of the Nass River. It is a question whether this fish was the true cod or one of the several unrelated species which bear the common name of cod.

Capt. Matthew Turner seems to have been the pioneer in the dis covery of the commercial possibilities of the great cod banks of the Pacific Ocean. Mr. W. A. Wilcox, late field agent of the now United States Bureau of Fisheries, received from the late Capt. Turner the following facts in connection with his discovery of various banks and his exploitation of same:[b]

In 1857 Capt. Matthew Turner, master of the brig *Timandra*, 120 tons, sailed from San Francisco with an assorted cargo for Nicolaevsk on the Amoor River. He was detained, however, for three weeks at Castor Bay, at the head of the Gulf of Tartary, because the Amoor River was full of ice when he reached the Asiatic coast. While the vessel lay there waiting, anchored in 3 fathoms of water, the crew began fishing over the rail with hand lines simply as a pastime. They were surprised to find plenty of cod, averaging about 2 feet in length. Capt. Turner had not previously seen codfish, but some of his crew were familiar with the species, and he, knowing their market value at San Francisco, appreciated the importance of the discovery and became inter ested in the fishing. Two years later Capt. Turner made another trip to the

[a] Speech of Hon. Charles Sumner, of Massachusetts, on the cession of Russian America to the United States, 48 p. Washington, 1867.

[b] Report on the fisheries of the Pacific coast of the United States, by J. W. Collins. Report of United States Commissioner of Fish and Fisheries for 1888, p. 92, 93. Washington, 1892.

Amoor River. Reaching Sakhalin Island, off the Gulf of Tartary, he began fishing for cod and found them very abundant. Only enough were taken for ship's use, however, for he was not provided with the means to cure more.

In 1863 Capt. Turner once more sailed in the *Timandra* to Amoor River. But this time he went prepared to catch and cure some cod on his return voyage. Besides fishing gear he carried 25 tons of salt. Returning he stopped to fish at the Gulf of Tartary. Cod were plentiful at first, and 10 tons were taken in a few days and salted in kench. But suddenly the fish disappeared and none could be caught. Then the brig ran down the coast to southern Kamchatka, where fish were found in abundance, and excellent success was met with on the first day. The vessel lay near the rocky coast, and on the second day, during the prevalence of a dense fog, both anchors were lost. This mishap compelled Capt. Turner to abandon fishing and to leave the coast; he reluctantly sailed for home. His fish sold at San Francisco for 15 cents per pound, and his voyage would have been notably profitable if the loss of anchors had not interfered with obtaining a full fare. This was the first occasion that salt cod were landed on the west coast from Pacific fishing grounds.

In 1864 Capt. Turner sailed in his brig on a cod-fishing voyage. Thus the *Timandra* was the first vessel to engage in this industry from Pacific ports. On the same grounds visited the previous year a fare of 100 tons of codfish was obtained and the voyage was remunerative. The same year the schooner *Alert* made a trip to Bristol Bay, Alaska, in pursuit of cod. Her voyage proved a failure, for she took only 9 tons of fish.

Capt. Turner states that since he made his voyages to the Gulf of Tartary, as related above, no American vessels have gone there to fish for cod. His success, however, had a very decided effect upon the cod-fishing business in the North Pacific, and in 1865 six vessels sailed from San Francisco to the Okhotsk Sea in pursuit of cod. These were the first American vessels to visit that region on cod-fishing trips, and their sailing evidenced a resolution to begin the business upon a broad commercial basis.

But Capt. Turner, who seems to have possessed the spirit and enterprise of a pioneer or discoverer, determined to look for cod-fishing grounds nearer home. Not disheartened by the ill success of the *Alert* in 1863, he sailed for Alaska on the schooner *Porpoise*, of 45 tons, March 27, 1865, and arrived at the Shumagin Islands May 1. He began fishing the same day. Cod were abundant and close inshore. As a result, he returned to San Francisco on July 7 with a fare of 30 tons of fish—something less than a full cargo, which might easily have been secured, only for the desire to market the catch in advance of the arrival home of the vessels that had sailed to the fishing grounds on the Asiatic side of the Pacific. This was the first fare of cod from the Shumagin Islands, a locality since famous in the annals of the Pacific codfishery.

The cod-fishing fleet of 1864 was composed wholly of rather small-sized schooners, most of which were originally built in New England for the Atlantic fisheries, but had sailed around Cape Horn to find employment in the business of the Occident. It is remarkable that one of those that crossed the Pacific, sailing about 5,000 miles from home, was only 20 tons, a mere boat in which to make such a voyage, and to return loaded "nearly decks to the water." Following are the names and tonnage (in round numbers) of the fleet: *Equity*, 63 tons; *Flying Dart*, 84 tons; *H. L. Ruggles*, 75 tons; *J. D. Sanborn*, 71 tons; *Mary Cleveland*, 91 tons; *Porpoise*, 45 tons; and *Yaccon*, 20 tons.

The Okhotsk Sea fleet all secured full fares and returned in safety. The fish were small, averaging only about 3 pounds each when dry. But in those early

days they were in demand and sold for from 12½ to 15 cents per pound, a pric that gave remunerative returns and the promise of future success for th fishery. There was no lack of cod, and even with the method of fishing wit hand lines over the vessel's side then in vogue, no difficulty was experience in filling moderate-sized schooners in a reasonable time.

The first vessel to visit Bering Sea for cod was the schooner *Aleri* from San Francisco, in 1864. But little is known of this vessel an her owner or owners, but it is recorded that the venture was a failure as only 9 tons of cod were secured.

The regular Bering Sea fishery was inaugurated by the schoone *Tropic Bird*, owned by the McCollam Fishing & Trading Co., of San Francisco, in 1882. The schooner *Isabel* also visited the Bering Sea banks a few weeks later than the *Tropic Bird*. Both made good catches, and as a result the next year five vessels visited these banks.

The schooner *Minnie G. Atkins* in 1867 discovered the Simeonofsky Bank, or what is now known as the Shumagin Bank. It was next visited by the schooner *Shooting Star*, formerly of Vinal Haven, Fox Island, Me., in 1870, and next by the *Scotland* and *Amanda Ager*.[a]

The first fleet of any size to fish around the Shumagin Islands was in 1867 and consisted of three schooners, the *Sanborn*, Capt. Morse; the *Porpoise*, Capt. Turner; and the *Sarah Louise*, Capt. Holcomb. Most of the fish were caught off the western side of Nagai Island, on banks discovered the same season by these vessels.

J. L. McDonald[b] has the following to say as to the influence of the discoveries of these prolific banks in the Gulf of Alaska upon the negotiations for the cession of Russian America to the United States:

In January, 1866, the author, while attending the session of the legislature at Olympia, the capital of Washington Territory, determined to make another bold push for Alaska by soliciting the good offices of our Government for the purpose of obtaining a permanent foothold and to open the prolific fishing grounds in those regions to our ambitious fishermen. To this end we penned the following memorial:

"To His Excellency ANDREW JOHNSON,

"*President of the United States:*

"Your memorialists, the legislative assembly of Washington Territory, beg leave to show that vast quantities of cod, halibut, and salmon of excellent quality are found along the shores of Russian America. Your memorialists respectfully request your Excellency to obtain such rights and privileges of the Government of Russia as will enable our fishing vessels to visit the harbors and its possessions, to the end that fuel, water, and provisions may be obtained; that our sick and disabled fishermen may obtain sanitary assistance, together with the privilege of taking and curing fish and repairing vessels in need of repairs. Your memorialists further request that the Secretary of the Treasury be instructed to forward to the collector of customs of this (Puget Sound) district, such fishing license, abstract journals, and log books as will enable our hardy

[a] The Cod Fishery of Alaska, by Tarleton H. Bean. The Fisheries and Fishery Industries of the United States, pt. II, sec. 5, vol. I, p. 213. Washington, 1887.

[b] Hidden Treasures, or Fisheries Around the Northwest Coast, by J. L. McDonald, p. 11.

fishermen to obtain the bounties now paid to the fishermen in the Atlantic States. Your memorialists finally pray your Excellency to employ such ships as may be spared from the Pacific naval fleet in surveying the fishing banks known to navigators to exist from the Cortez Bank to Bering Strait."

This memorial, written by a fisherman in behalf of the fishing industry on the northeast [west] coast, passed both branches of our Territorial legislature with commendable unanimity and dispatch. In forwarding a copy of the above-named memorial to the Secretary of State we imparted such information touching the fisheries around the Russian possessions, and the impulse which the opening of those resources to our fishermen would impart to the commercial development on the northwest coast. In acknowledging our humble services the illustrious Secretary assured us that "in consummating the recent purchase, I was strongly fortified by the letters which you wrote to me touching the valuable fisheries in those waters." The New York Times of April 1, 1867 (the acknowledged organ of Secretary Seward), said "that a memorial from the Territorial legislature of Washington Territory, dated January, 1866, asking the President to obtain certain rights for the fishermen, was the foundation of the present treaty."

On the 18th of October, 1867, the transfer of this vast territory from Russia to the United States was officially consummated by the respective commissioners of the two Governments at Sitka, in the presence of the Russian population, who cheerfully welcomed the few Americans there also present. The union has been very cheerfully accepted by the people of the Territory. Our Government, on assuming possession, found numerous adventurers from the Pacific States domiciled in various parts of the Territory engaged in trade and in developing the resources in those regions; vessels laden with ware entered every harbor; stores were opened as by magic in every acceptable roadstead along the southern and western coasts; an active competition for furs, oil, ivory, old copper, iron, and junk was earnestly inaugurated; commerce revived, the sails of our vessels whitened every creek, bay, and sound, and the staid Russians very soon obtained an insight into Yankee progress on the go-ahead principle.

The acquisition of Alaska by the United States in 1867 proved an especial boon to our cod fishermen, as it secured them from any interference on the part of the Russians, who had not welcomed them very heartily in previous years. This is well shown by the fact that while the fleet in 1867 numbered 3 vessels, the fleet of 1868 comprised 14 vessels.

The first vessel to attempt to make two trips in one season was the schooner *Porpoise*, Capt. Caton, in 1868, but she got only half a fare on the second.

The first Alaska vessel in the fishery was one owned by Capt. Haley, of Wrangell, who in 1879 visited the Hoocheno Bank, in Chatham Strait, southeast Alaska, and purchased his fare from natives who claimed the exclusive right to engage in the fishery. These fishermen used bark lines, with wooden iron-pointed hooks, and, as they considered a catch of 30 or 40 fish a good day's work, Capt. Haley had to wait quite a while before he could accumulate a cargo. In later years several vessels engaged in the business along the same lines as Capt. Haley.

An odd feature of the Pacific cod fisheries is that neither Portland nor Astoria have ever had vessels engaged in it. In 1877 Capt. Joshua Slocum, with the schooner *Pato* (about 45 tons register), was at the Philippine Islands, when he conceived the idea of making a cod-fishing voyage to the Okhotsk Sea and marketing his catch at the islands. Leaving the islands in March, he proceeded to the Okhotsk via Yokohama. Salt and fishing gear were obtained from vassels met with in the sea, and a cargo of 23,000 fish was soon taken. When the time for sailing arrived the captain decided not to return to the islands, but took his fare to Portland instead, where he sold it at a profitable price. This was the only fare of cod to be landed at Portland.

For the first few years of the fishery no suitable arrangements were in existence at San Francisco or elsewhere on the coast for curing the fish. In certain cases the fishermen received their share of the voyage in fish, which, after being cured in a good, bad, or indifferent manner by themselves, were hawked around the city.

The late Thomas W. McCollam, of San Francisco, enjoys the distinction of having been the first man on the Pacific coast to establish the industry on a permanent basis. In 1867 he bought his first cargo of cod, and the next year he bought and cured several cargoes at Old Sausalito, but as this locality was not satisfactory he soon after established a new station at the mouth of Redwood City Creek, about 30 miles south of San Francisco.

Having decided to engage directly in fishing himself, Mr. McCollam went east in 1868, and in New England purchased the fishing schooners *Rippling Wave*, *Wild Gazelle*, and *Flying Mist*. The first was lost on the passage in Magellan Strait; the others arrived safely and were immediately outfitted and sent north to the Shumagin Islands for cod. In addition to handling his own fish he also continued to buy the cargoes from other vessels.

In 1873 a partner was taken into the business and the firm was then known as Thomas W. McCollam & Co. In 1874 the schooner *Alfred Adams* was added to his little fleet, while the *Flying Mist* went sea-otter hunting on the Asiatic shore.

In 1876 the firm again changed the location of its home curing station, removing to Pescada Landing, opposite Sausalito, on Richardsons Bay, where its successor, the Union Fish Co., still carries on the business. In 1883 several new members were admitted into the firm and its name changed to the McCollam Fishing & Trading Co.

The first shore fishing station for cod in Alaska was established by this firm at Pirate Cove, Popof Island, in the Shumagin Group, in 1876, a more detailed description of which will be found in the chapter devoted to the history of the shore fishing stations in Alaska.

In 1893 the Pacific Marine Supply Co. was organized in San Francisco for the purpose of engaging in cod fishing and the carrying on of other business. The first published record we have of the company engaging in cod fishing was in 1896, when the former whaling schooner *La Ninfa* (also given as *LaNympha*) was outfitted and sent to Bering Sea. In 1904 the name was changed to the Alaska Codfish Co., and the business has been operated under this name since. In addition to a fleet of vessels the company also owns and operates a number of shore stations in Alaska.

In 1898 a combination of several San Francisco firms operating in the cod fishery, notably the McCollam Fishing & Trading Co. and Lynde & Hough, was formed and the name Union Fish Co. was selected for the new company.

From the very beginning San Francisco has occupied the premier position in the fishery, in fact, for many years it was the only place on the coast where cod vessels were outfitted. The industry fluctuated much and the changes in the personnel were frequent. The late Mr. Charles P. Overton, for many years before his death connected with the Union Fish Co., and one of the brightest men engaged in the industry, has written considerable upon the early history of the San Francisco fleet, and the author quotes from his writings as follows:

> While making a review of the past years in the codfish business, probably the most interest would lie in recalling the names of those who have been prominently identified with the industry. Considering the few years that the business has been carried on and the restricted nature of it, the list is a surprisingly long one, and is one that should be published as a record to be preserved among the archives of the industry.
>
> First, there was Capt. Turner himself. Like most pioneers he did not make much of a financial success of it and soon abandoned it to others.
>
> Sometime previous to 1870 Miller & Hall, the hay merchants, sent the brig *T. B. Lunt* two or three times. The fish were sold by Lynde & Hough, but the returns did not pay cost and interest and they dropped out.
>
> Andrew Crawford, the ship chandler and Tahiti trader, had a schooner in the codfisheries previous to 1870. From 1870 to 1873 he operated the bark *Legal Tender,* Capt. Wentworth. At first there was a profit, but the last two years were so unfavorable that Crawford withdrew from codfishing and turned his entire attention to the South Sea trade.
>
> Donald Beadle was one of the prominent figures "on the front" in the early days having interests in the commission and shipping business, and in the old firm of Goodall & Perkins, and with Moss in some of the southern coast landings. Like everybody else on the front he had his turn at the codfish fever and was interested in the voyages of the *Bernice, Kinau,* and bark *Union.* At that time the fish were all cured direct ex-vessel and so many spoiled before they were sold that the losses were considerable.
>
> Capt. Wing, backed by the funds of his son-in-law, Bailey Sargent, of the American Exchange, bought the little bark *Domingo,* and the captain became a codfisher. With an occasional diversion to South Sea trading, he fished with more or less regularity for five or six years, Sargent backing the ventures until the captain died, practically of old age.

Col. C. L. Taylor dipped in as a venture about 33 years ago, and he still refers sadly to what it cost him for his experience.

In 1874 and again in 1876 a Capt. Jacobsen sent the little schooner *San Diego* to the Choumagin Island grounds under Capt. Wentworth. Two voyages were enough; then he sent her sealing. Explaining the change, he said: "Well, Capt. Wentworth is a goot mon, but he is too expensible."

James J. Laflin, or, as everybody "on the front" knew him, Jimmy Laflin, a sailor boarding-house keeper, who would furnish a crew for any vessel "and no questions asked," operated the schooner *Alaska* in the codfisheries during the seasons of 1876–1879. The first two years the cargoes arrived on a bare market and the profits were good—good enough to induce such an increased catch by him and others as swamped the market, and after the two years of good business and then two years of correspondingly bad business, Jimmy diverted his vessel into other trade, and she was finally lost in the Bering Sea bringing down a company of Alameda mining men from Golovin Bay.

Johnston & Veasey (1877–1879) were among the old-timers at it. They held on for three years. Veasey, later, drifted into a small produce business and died poor many years ago. Capt. Johnston got down to going to sea again on monthly wages and then drifted around the water front looking for a berth of some kind and finally disappeared.

Another of the old-timers (1879–1884) was John Molloy, the junk and second-hand man of Clay Street, with the old brig *Glencoe* in the codfish business as a side issue. Like everything else that old John had, the vessel was poor, the salt was poor, and the fish were, of course, yellow or sour, dried up or slimy, but they went onto the market and helped damn Pacific codfish. Old John had a brother-in-law, a wealthy wholesale grocer, who furnished checks to keep him going. When the brother-in-law withdrew his support, old John went around town, bought everything he thought his credit would stand, and quietly went into bankruptcy—paying nothing on the dollar. He is dead and doubtless gone to his just reward. Any unkindness I may feel toward old John may possibly be because we were on the list of creditors when the end came.

From 1882 to 1888 Ed. H. Hansen, of Wright & Bowne, and Capt. A. Anderson, now of the Lewis, Anderson, Foard Co., with some others, operated the schooner *Isabel*, Capt. Nickerson, in this business. For the first two or three years they caught the market short and did so well that they added the brig *W. H. Meyer*. But about this time the production began to exceed the demand, and they soon had to drop out the brig. Business became so poor they did not keep the old *Isabel* in good repair, and in the spring of 1888, while on her way to the fishing banks, she opened up somewhere out at sea. As many of the crew as could do so got into the dories, and after suffering many privations about half of them were rescued more nearly dead than alive. This ended the venture, and the partners paid up their losses and quit.

In 1883 Higgins & Collins, the wood and lumber men, with Wheeler Bros., small tugboat men, fitted out the schooner *Bonanza* on an eastern basis, importing eastern fishermen and eastern gear. They cured their fish on the deck of the vessel in Oakland Creek, and when they closed up their accounts each of the partners was an even $2,500 to the bad. That schooner *Bonanza* had an eventful and varied career. Built in 1875 as a yacht for William C. Ralston, the brilliant but unfortunate manager of the Bank of California, she has been freighter, trader, codfisherman, and finally as a whaler was crushed in the ice last year in the Arctic near Herschel Island. The story of her voyages to the remote and unfrequented waters of the North and South Pacific, the Behring Sea, and the Arctic Ocean would be worthy the pen of Robert Louis Stevenson.

In 1886 James Madison and some of his associates fitted out the schooner *Francis Alice*, and also started a little station at Ikatok in Alaska. The fish

were offered on the street by Frank Bates, a broker, but the trade was filled up by the old companies, and the fish found such slow sale that the whole cargo was bought in by this company at a very low price. We later took over the station, and the schooner and the business was entirely closed out. Like a butterfly, it lived but one summer.

In 1894 a Capt. Jorgenson bought the condemned steamer *Salinas*, converted her into a three-masted schooner, rechristening her the *Uranus*, and sent her codfishing. He did fairly well for two years then, with the backing of the firms outfitting him, he added the *W. F. Harriman*, also a condemned hull refitted. At the end of the third year his whole outfit passed into the hands of those who had been backing him, and he was known in the codfish business no more.

Young Duggan (1902) had a short and inglorious career as a codfish man, and some of the money that his father made in the shirt business went to pay what it cost the young man to listen to the siren song of the wily promoter. The schooner *J. G. Wall* went to the Bering Sea under the joint command of Capt. Dollard (the promoter) and Henderson (an experienced codfisher). We bought their season's catch, and it lasted us just three days. One season was enough for Mr. Duggan.

Undoubtedly the most picturesque figure in the whole line was Nick Bichard. A native of the Isle of Jersey, a pioneer shipowner and merchant of San Francisco, he accumulated a fortune during the days of the Civil War and was early in the codfish business with quite a fleet of old vessels, both large and small, and for many years he was a prominent factor in the business. A large, swarthy man, erratic in speech and action, mixing codfish, coal, lumber, and junk, keeping most of his books in his head, he never knew what his cargoes cost him nor what they sold for. The codfish business absorbed more and more of his capital; then his real estate, two fine water lots on Stuart Street, the gore lot at California and Market Streets, and other property went the same way; the old vessels wore out and were lost and he finally died peacefully in the night of heart failure, leaving barely enough to bury him.

Chief among the old-timers and of those most largely interested and longest in the business was the firm of Lynde & Hough, two enterprising Yankees of the old school who started in Sacramento in pioneer days, came down to San Francisco, were in the commission business and, from selling codfish on commission, drifted into the cod-fishing business [in 1865] itself. They were for many years among the heaviest operators in codfish and, in addition, they dealt in all other kinds of salt fish, cornered the honey market, dipped into sealing in the Straits of Magellan, South Sea Island trading, fishing and trading stations in Alaska, salmon fishing, freighting, running a coasting passenger steamer, and anything else that promised a dollar, including "Okhotsk Sea Cod Liver Oil" and "Dr. Fisherman's Lotion for Man and Beast." They and their surviving partner, L. E. Noonan, were well and favorably known from Alaska to South America and from Hawaii to Australia and the Orient. Their last venture was codfish mixed with mining, and finally both of the senior partners died, leaving no money but various debts behind them. Their location at California City was sold to the United States Navy Department for a coaling station, and their vessels and cod-fishing business were merged into the Union Fish Co.

L. E. Noonan was connected with the Lynde & Hough company for nearly 40 years, at first as general factotum and handy-man-ready-for-anything. He ran the fish yard, outfitted the vessels, hired captains and crews, packed and repacked salmon and mackerel, bought and sold on the street. Later he acquired

an interest in the firm and, being of a more thrifty disposition and not interested in the mining, he was enabled to retire with enough to permit him to take a well-earned rest.

These epitaphs of those who have dropped into the business and then dropped out run in schools. Their course is something like this: The bright sun of prosperity shines for a season or two upon the regular stand-bys in the business and it looks very attractive and inviting to some chaps with an old vessel or a little spare money. So they jump in and for a time cut a brilliant dash in the business. So bright are they that the sun of prosperity is all in eclipse and everyone in the trade walks in shadow. When they get tired of this or broke they drop out, and those who are left pick up the scattered ends of the trade, struggle out into the light again, and by and by there is some more prosperity and then a new crop of hopeful investors appears, and so on and on.[a]

One of the most picturesque figures in the industry, and one who cut a wide swath while in it, was Edward Pond. Beginning in 1902, with apparently no end of money, he sent two vessels to Bering Sea. In 1905 his fleet had increased to three vessels, two of which fished in the Okhotsk and one in the Bering Sea. Prices for fish were low in 1906 and 1907, and when the two vessels he had sent to the Okhotsk Sea in the latter year returned virtually empty, having been driven from the sea by the Russian authorities, he was forced to the wall, and his stock of fish on hand and to arrive was taken over by the Union Fish Co.

In 1905 the Pacific States Trading Co. was organized at San Francisco. A home-curing station was built on Carquinez Strait, about 30 miles from San Francisco, and named Woodside Glen. The schooners *Glen* (121 tons) and *John F. Miller* (170 tons) were sent to Bering Sea. The company also built several shore stations in Alaska, as noted elsewhere. Later the company added the schooners *Ottillie Fjord* (247 tons) and the *Dora Bluhm* (315 tons) to its fishing fleet. On September 30, 1907, the schooner *Glen* was lost on Unimak Island, with the loss of one life. While the schooner *John F. Miller* was engaged in an attempt to salve the wrecked schooner a gale suddenly sprang up on January 8, 1908, and she was also driven ashore, 10 of her crew losing their lives. This disaster to two of its fleet, together with a heavy overproduction in 1908 causing a slump in the market, compelled the company to cease operations for a season or two. In 1909 the company's schooner *Ottillie Fjord* was outfitted and sent north by the Union Fish Co. In 1910 all operations were suspended, but in 1911 the company resumed operations at its shore station in Northwest Harbor, and also outfitted and sent north the schooner *Ottillie Fjord*, and operated continuously until early in 1916, when the company finally abandoned the business.

[a] Pioneers in the Pacific Coast Codfish Industry, by C. P. Overton. Pacific Fisherman Annual, 1906, p. 70, 71, and 75.

For a number of years the majority of the San Francisco vessels resorted to the Okhotsk Sea for their cargoes of cod, and in some seasons nearly all of the vessel fishing was prosecuted there. In 1892 the Russian Government began to enforce a regulation imposing a license on all vessels fishing within 30 miles of shore, and from this time on the American vessels experienced alternate periods of harassment and quiet, according as the disposition of the Russian Governor was toward lax or rigorous enforcement of the regulation. A typical instance of such harassment is cited by Wilcox.[a]

The three-mast schooner *Hera*, 369 net tonnage, of the San Francisco codfish fleet, was the only American vessel that fished in the Okhotsk Sea. Her catch was all made from 10 to 30 miles from the shore. While fishing, the vessel was boarded by a Russian officer, who ordered that fishing cease and that the vessel report at once to the governor of the district and there procure a license. The master of the *Hera* denied that he was fishing in waters of Russia, as he was fully 10 miles from shore. The officer threatened to seize the vessel if his order was not obeyed. The master complied, and on reporting to the governor again protested as to his having any legal right or authority to interfere with him when fishing so far from land, no fishing having been attempted under 10 miles from shore. As before, a protest was not recognized, and $1,000 in gold was demanded for a license that must be procured before the vessel would be permitted to leave the port. A compromise was made by the master giving, under protest, his personal order for $1,000 on the owners of the vessel at San Francisco. The vessel then returned to the fishing grounds, completed her cargo, and returned to San Francisco with a catch of 159,000 codfish, of a net weight of 685,140 pounds. The order given by the master was forwarded to the Russian consul at San Francisco for collection; but the draft having been given under compulsion its payment was refused.

In 1907 matters began to assume a serious aspect. That year the following vessels had visited the Okhotsk Sea: The schooner *John D. Spreckles*, the barkentines *Fremont*, *City of Papeete*, and *S. N. Castle*. Shortly after the vessels arrived and began fishing the Russian gunboat *Mandjur* appeared, and an officer boarded the *John D. Spreckles* and *S. N. Castle*. Taking their papers, the commander ordered the vessels to quit fishing, claiming they were within the 30-mile limit, and threatening to seize the vessels if they did not. As a result the vessels left the sea and returned to San Francisco almost empty.

A few days later, on June 12, the gunboat met and boarded the *Fremont* and seized her papers, also.

On June 19 the gunboat came alongside the *City of Papeete*, and the Russian commander seized her papers and ordered her to quit fishing. Capt. Stensland, the master of the *City of Papeete*, went aboard the Russian patrol boat and showed her commander a copy of an opinion written several years before by John Hay, while Sec-

[a] Notes on the Fisheries of the Pacific Coast in 1895, by W. A. Wilcox. Report of United States Commissioner of Fish and Fisheries for 1896, p. 634, 635. (1898.)

retary of State, to the effect that under international law the vessels of any nation had a right to fish at any point 3 miles or more offshore. In anticipation of just such a happening this copy had been furnished to the master by A. Greenebaum, president of the Alaska Codfish Co., owners of the vessel. Secretary Hay's opinion seemed to have considerable influence with the officer, who at once steamed to the mainland to seek advice from his superior officers. On July 10 he returned and restored the ship's papers to the master, admitting that the 30-mile limit for fishing was not to be enforced.

On July 12 the Russian gunboat steamed alongside the *Fremont* and restored not only her own papers but also those of the *John D. Spreckles* and *S. N. Castle.*

In 1908 a fleet of three vessels fished in the Okhotsk Sea, while in 1909 only the barkentine *Fremont* fished on these banks. The latter vessel's master reported a considerable fleet of Japanese vessels fishing there for cod. This was the last season in which American vessels visited the Okhotsk Sea for cod.

In 1891 Capt. J. A. Matheson, of Provincetown, Mass., who had been engaged in the Atlantic codfishery for a number of years, sent his schooner *Lizzie Colby* around the Horn, coming himself by rail and establishing himself at Anacortes, Wash., and sent his vessel to the Alaska banks, this being the first venture on the coast other than from San Francisco. In 1905 the schooner *Fanny Dutard* was added to his fleet. In 1906 the schooner *Lizzie Colby* dropped out. In 1908 the schooner *Harriet G.* was purchased and it and the *Fanny Dutard* sent north. In 1909 the same fleet was sent north, but in 1910 only the *Fanny Dutard* was outfitted. San Francisco parties, as noted elsewhere, purchased the plant and fleet in 1910, incorporated it as the Matheson Fisheries Co., and installed Capt. Matheson as manager. In 1912 he dropped out altogether, but late in 1914 purchased the fleet of the Matheson Fisheries Co.—the schooners *Azalea* and *Fanny Dutard*—and sent it north under his own name in 1915.

The Puget Sound & Alaska Commercial Co. was the pioneer in the cod fishing industry from Seattle, Wash. It began operations in February, 1892, and on March 5 dispatched the schooner *Moonlight*, of 68 tons, to the Bering Sea banks. The vessel returned on August 20 with 175,000 pounds of salt cod. No more is heard of the company after this first venture.

In 1896 Tracy H. Robertson organized the Oceanic Packing Co., with headquarters in Seattle, and outfitted and sent to Bering Sea the schooner *Emma F. Harriman.* She returned with a full cargo, but as the demand in the Northwest for cod was quite slack, the vessel was sent direct to San Francisco and the cargo sold there.

In 1897 the company sent to Bering Sea the brigantine *Blakeley* and the schooner *Swan*. The vessels returned with full cargoes, and these were prepared for market at a plant the company had built in West Seattle.

The Klondike rush had begun in 1897, and in 1898 the company became interested in the transportation business and diverted its vessels into this industry, in the course of which the schooner *Swan* was wrecked. In 1899 and 1900 the brigantine *Blakeley* was sent to the Bering Sea banks by the company, and returned each season with full cargoes. The business had not proved very profitable, however, and the company ceased operations in the latter year.

In 1898 Mr. Fay, a Seattle lawyer, sent the schooner *Lizzie S. Sorrenson* (89 tons) to Bering Sea. She returned with a full cargo and the fish were worked up at a plant built at Richmond Beach. The venture could not have been very profitable, as only the one trip was made. The *Lizzie S. Sorrenson* was a comparatively small schooner and her chief title to fame rests upon the unusual fate she eventually met. In 1909 the Tyee Co., which then operated a shore whaling station at Tyee, southeast Alaska, purchased the schooner, which was thereupon fitted with a gasoline engine and turned into a whaler. On May 10, 1910, a whale was sighted in the ocean about 8 miles southwest of Cape Addington. The vessel was cautiously worked to within gunshot and a harpoon driven into the animal. The weapon failed to reach a vital spot, and after an effort to escape the gigantic mammal turned suddenly, and charging the vessel, struck her full in the stern. The impact knocked out a portion of the vessel's bottom and she sank in a few minutes.

The Seattle-Alaska Fish Co. began business in Seattle in 1902, using for its home station the old West Seattle plant of the Oceanic Packing Co. The first year the schooner *Carrier Dove* was the only vessel outfitted, but in 1903 the schooner *Nellie Colman* was added. In 1906 the latter vessel was sold, her place being taken by the schooner *Maid of Orleans*. Only the *Carrier Dove* was outfitted in 1907, but in 1908 she was sold and the *Maid of Orleans* outfitted. In 1910 the company was absorbed by the King & Winge Codfish Co., of Seattle.

In 1904 the late Mr. W. F. Robinson, who had been connected with the New England fisheries for a number of years, and others bought the schooner *Alice* and, under the name of the Schooner Alice Co. (Inc.), sent her north. In 1905 the corporate name was changed to the Robinson Codfish Co., the schooner *Joseph Russ* purchased, and a large plant constructed at Anacortes, Wash. In 1911 the original plant was sold and another erected at once on the company's property in connection with a by-products plant which they owned. In 1912 the name of the company was changed to the Robinson Fisheries

Co. On April 20, 1912, the schooner *Joseph Russ* was lost on Chirikoff Island, Alaska. In 1914 the schooner *Wawona* was purchased and the same year she brought home the largest trip of cod, 240,000 fish weighing about 1,100,000 pounds, ever caught and landed from an American vessel. In 1915 she broke her 1914 record with a catch of 258,323 fish weighing approximately 1,150,000 pounds.

In 1904 the late Andrew Webber, of Seattle, made a venture in the industry by sending to Bering Sea the little schooner *Ida May*, and repeated it the next season, after which he withdrew.

In 1905 the King & Winge Codfish Co., composed principally of King & Winge, the well-known shipbuilders of Seattle, sent the schooner *Harold Blekum* (185 tons) to the Bering Sea banks, and continued doing so, adding the schooner *Vega* later, until 1910, when the company joined the consolidation known as the Western Codfish Co. The company had its home-curing station located in West Seattle.

The Blom Codfish Co. was organized in Tacoma in 1905 and sent the schooner *Falcon* (195 tons) north, in the meantime building its home-curing station at Quartermaster Harbor. The company had a very checkered career, finally ceasing business in 1914, when its assets, including the schooner *Fortuna*, passed into the hands of Seattle parties, who organized the Northern Codfish Co. for the purpose of carrying on the business. The latter company sent the vessel north in 1915, but dropped out of the business early in 1916 the schooner being chartered to the Pacific Coast Codfish Co.

The Pacific Coast Codfish Co. was formed in 1911 by former stockholders of the Seattle-Alaska Fish Co., which had been sold to the King & Winge Codfish Co. The company constructed a home-curing station at Poulsbo the same year, and sent north the schooner *John A.* In 1913 the schooner *Chas. R. Wilson* was added, and in 1914 the schooner *Maid of Orleans*, while in 1915 the schooner *Fortuna* was chartered and added to the fleet.

In 1910 T. Tilmann, jr., of the firm of Tilmann & Bendel, and other San Francisco parties, none of whom had heretofore been engaged in the business, attempted to form a consolidation of the Puget Sound companies. A controlling interest was secured in the King & Winge Codfish Co., and this company then purchased the Seattle-Alaska Fish Co. The two properties were then merged under the name of the Western Codfish Co. The property of Capt. J. A. Matheson was purchased and it was incorporated under the name of the Matheson Fisheries Co., with Capt. Matheson in charge of operations. In the meantime the Union Fish Co., of San Francisco purchased the cargoes of the schooners *Joseph Russ*, *Alice* and *Fortuna*, the two former belonging to the Robinson Fisheries Co. and the latter to the Blom Codfish Co. The Western Codfish Co.

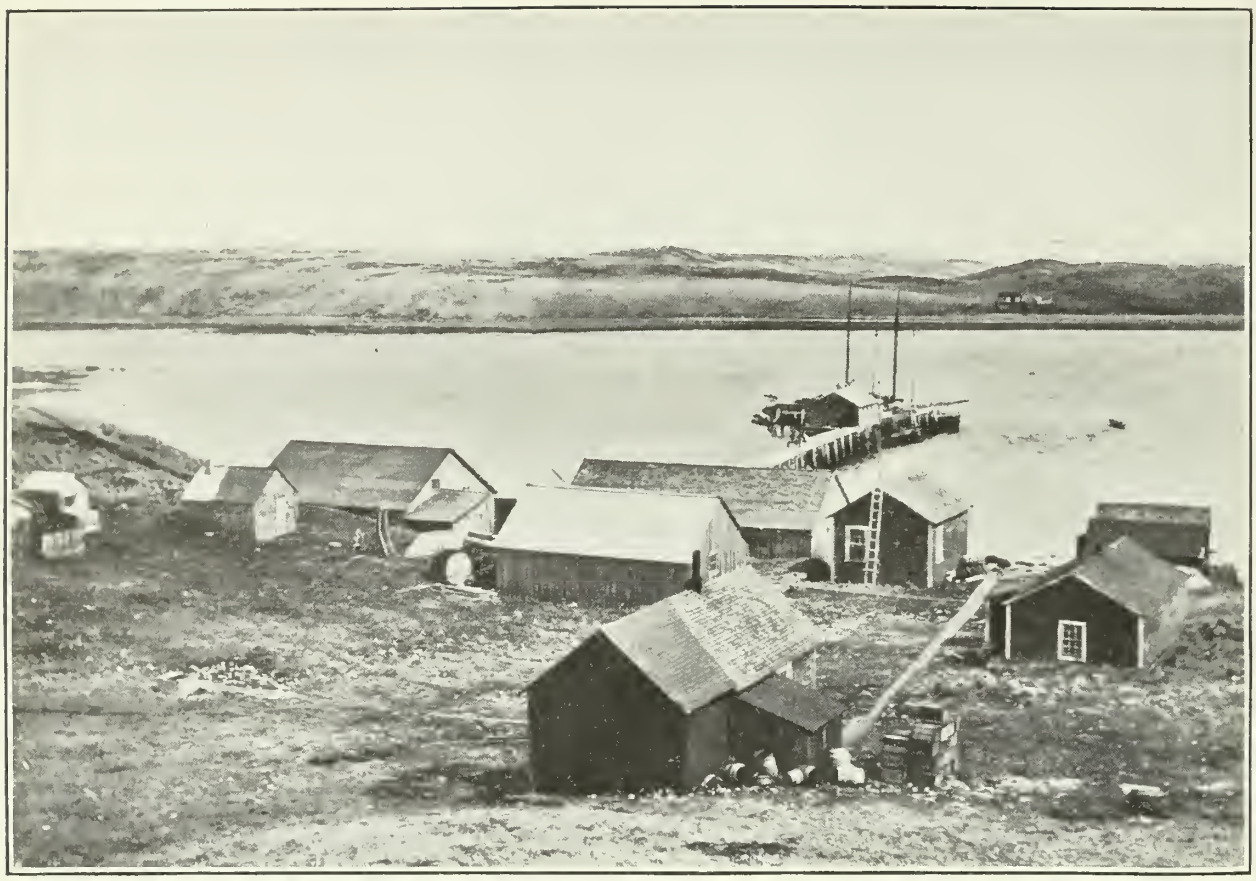

FIG. 1.—UNION FISH COMPANY'S PAVLOF STATION, SANNAK ISLAND, ALASKA.

FIG. 2.—PIRATE COVE, THE PIONEER CODFISH STATION OF ALASKA.

had but a brief existence, dropping out of active fishing operations early in 1912, while in December, 1914, Capt. Matheson bought from the Matheson Fisheries Co. the schooners *Fanny Dutard* and *Azalea* and sent them north in 1915 under his own name. After disposing of its 1914 catch of cod the Matheson Fisheries Co. wound up its active career in the summer of 1915.

The first Canadian company to engage in cod fishing on the Pacific banks was the Western Canadian Fish Co. This company built a home station at Barnet, British Columbia, in 1903, and sent the brigantine *Blakeley* to Bering Sea. The company struggled along until the latter part of 1905, when it went out of the business.

In 1913 the Canadian Fish & Cold Storage Co., of Prince Rupert, British Columbia, outfitted the schooner *Albert Meyer* and sent her to the Bering Sea banks. She arrived there at almost the end of the fishing season, and as a result brought back but a few hundred fish. The vessel made another trip in 1914, when it met with fair success. As the market was very poor when she returned, the company gave up this branch of its business.

HISTORY OF ALASKA SHORE-FISHING STATIONS.

The natives living in the vicinity of the great cod banks of Alaska have depended upon them for a considerable part of their food supply, although not to such an important extent as they have upon the salmon. When the Russians came more and more home use was made of cod, and the same is true of their creole descendants to-day. With the exception of a few small shipments made from Kodiak in the early years of the industry, the catch of the natives and few whites living at other than the regular cod stations has all been consumed locally.

The late Thomas W. McCollam, of the McCollam Fishing & Trading Co., of San Francisco, was the first to perceive the advantages to be obtained from establishing stations close to the cod banks, where the fishermen could go out daily in dories to the adjacent banks and the catch be stored ashore until a cargo accumulated, when a vessel could be sent north to bring them to San Francisco.

Early in the seventies a party of hunters had established a station at Pirate Cove, a very pretty and well-sheltered cove, with ample depth of water, at the north end of Popof Island, one of the Shumagin Group. A wharf and several buildings had been constructed by the party. Mr. McCollam purchased this station and established here the first regular shore fishing station for cod in Alaska.

An agent and about eight fishermen were stationed here during the early years of its existence. At first the fish were all kenched, but later on tanks were sent up and the fish held in pickle until shipped.

The station gradually increased in size and importance, and to-day, as well as in the past, is the largest and most important one in Alaska.

In 1886 a branch fishing station was established on Pavlof Harbor, Sannak Island. In 1890 a station was opened at Kasatska, on the south side of Sannak Island, and was operated for several years, finally being abandoned because of the dangerous navigation for sailing vessels on that shore. The Port Stanley, Sannak Island, station was established in 1891, but was abandoned a few years later. All of these were what are known as "winter stations," that is, stations operated in what are known as the winter months in Alaska; during the rest of the year the fish are too far out in the deep water for fishing with dories with the shore as the base.

In 1892 a station was established on Sanborn Harbor, Nagai Island, Shumagin Group, and this has been operated almost continuously ever since. Fishing is carried on here from the middle of spring to late summer.

In 1883 Ivan Petroff built a fishing station on Sitkalidak Island, close to the Indian village at Old Harbor, on the channel separating Sitkalidak from Kadiak Island, where for a time considerable quantities of cod were cured and shipped to San Francisco.

In 1886 James Madison and associates, of San Francisco, fitted out the schooner *Francis Alice*, and also started a small station at Ikatak, on Unimak Island. The venture lived but one season, the station then being taken over by the McCollam Fishing & Trading Co.

Lynde & Hough, a well-known San Francisco firm, early entered the codfish industry and for a number of years were important factors in it. Besides a fleet of vessels the firm established a number of shore stations in Alaska. The earliest of their stations was at Sand Point, on Humboldt Harbor, Popof Island, in the Shumagin Group. This was in 1887. It was established principally as a trading and salmon fishing station, its relation to the codfish industry being mainly as a supply station where the firm's vessels could land their cargoes and refit for another trip without having to return to the home port for this purpose.

The firm built a number of shore stations shortly after this—Unga Harbor (1888 or 1889) and Squaw Harbor (1889), on Unga Island; Henderson Island (1889), in the Shumagin Group; Company Harbor (1889) and Nelson Island (1890), in the Sannak Islands; Chicago Bay (1890), Alaska Peninsula, and Ikatak (1890), on Unimak Island. Several of these had but an ephemeral existence, as Chicago Bay, Nelson Island, and Henderson Island.

About 1898 the McCollam Fishing & Trading Co. and Lynde & Hough formed the Union Fish Co. as a selling agency for their product. It was not until 1902 or 1903, however, after the

death of both Lynde and Hough, that the two concerns were finally merged into one and the whole business operated under the name of the Union Fish Co.

In 1876 Mr. A. Greenebaum, then and for a number of years subsequent, agent for the Alaska Commercial Co., built a trading station for the company at Acherk Harbor (later known as Company Harbor) on Sannak Island. A little codfishing was prosecuted at times, but it was not until 1896, when it became the property of the progenitors of the Alaska Codfish Co., that it was used for this business exclusively. In 1897 the company established another station on Moffet Cove, a few miles east of Company Harbor.

In 1896 the Alaska Codfish Co. opened its Kelleys Rock station, situated about midway between Unga and Squaw Harbors. This, like the Unga station, is an all-the-year-round station and is by far the most productive one owned by the company.

In 1906 the Alaska Codfish Co. bought the Alaska Commercial Co.'s station at the town of Unga, on Unga Island, and began fishing operations in the fall. The next year the Union Fish Co. built a station here, but on the opposite side of the harbor. Fishing is carried on here throughout the year.

The present Squaw Harbor station of the Alaska Codfish Co. was first established as a salmon saltery by a man named Olsen, who also utilized it at times as a codfish station. In the summer of 1903 the present owners purchased it and have very much improved it since. It is a winter station. Its principal use to the company is as a supply depot for its near-by stations, the harbor being one of the safest in the Shumagins.

The Dora Harbor, Unimak Island, stations of the Alaska Codfish Co. and the Union Fish Co. were established in 1897 and 1898, respectively. While they were quite productive the first two seasons, they have been steadily diminishing in importance ever since. The Sannak Island station men are transferred to these stations in the spring, after the cod have moved off into the deep water surrounding Sannak Island, and are brought back again in the fall when the fish have again returned to the shoal waters.

About 1903 the Union Fish Co. built a station at Wedge Cape, Nagai Island, and operated it intermittently as a summer station until 1909, when it was abandoned.

In 1903 the Union Fish Co. built a station at Eagle Harbor, on Nagai Island, and operated it continuously up to and including 1909, since when it has been shut down owing to the difficulty of securing enough men to work it.

The first Puget Sound company to establish a shore station in Alaska was the Seattle & Alaska Fish Co., of Seattle, which built a station at Falmouth Harbor, on Nagai Island, in the spring of 1903.

As this proved to be too far from the fishing grounds, the station was moved almost immediately to Squaw Harbor, on Unga Island. In place of the dories used at other stations, this company equipped the plant with Columbia River boats, two to four men going in each. The station was worked intermittently until 1910, when the company sold out to the King & Winge Codfish Co., which ultimately merged into the Western Codfish Co. It has not been operated since, owing mainly to its remoteness from the fishing grounds. It is now the property of John H. Nelson.

In the fall of 1902, John H. Nelson and John Einmo opened a shore station at Hard Scratch, on Snug Harbor, Unga Island, but operated it only one winter. In the fall of 1911 R. H. Johnson established a shore station here and has operated it ever since.

In the fall of 1905 the Blom Codfish Co., of Tacoma, Wash., built a station on the north shore of Eagle Harbor, Nagai Island, and operated it for a couple of years, when it was abandoned.

In the fall of 1905 the Pacific States Trading Co., of San Francisco, which had just recently started in business, established stations on Herendeen Island, Northwest Harbor, and at Ikatak, or Unimak Island, and operated them continuously until 1909. The latter station was not reopened, but operations were resumed at the former in the fall of 1911, and it was operated until early in 1916, when the company suspended operations and sold the station to the Union Fish Co. The Ikatak was a summer station, while the one at Northwest Harbor is a winter station.

In the summer of 1908 John H. Nelson, who had opened a station at Hard Scratch in 1902, started a station on Squaw Harbor and has operated it every year since. In the earlier years of its existence stockfish formed the bulk of the product, but during the last two years considerable dried salt cod has been prepared.

In 1914 A. Komedal, a merchant of Unga, established a station near that town and has operated it during the greater part of the time since.

In 1910 the Alaska Commercial Co. shipped to San Francisco aboard one of its regular trading vessels about 90 tons of cod which had been caught and cured by the natives of Kodiak. The fish proved to be quite small, and the company had so much difficulty in disposing of them that it did not repeat the experiment.

One of the heaviest handicaps under which Alaska station owners suffered for a number of years was the presence of saloons in close proximity to the more important stations. In 1913 there was one saloon at Sand Point (about 6 miles overland from Pirate Cove and about the same distance by water from four stations on Unga Island) and two at Unga; at and within a radius of 4 miles by land from the latter town are six shore stations. As a result of the close proximity

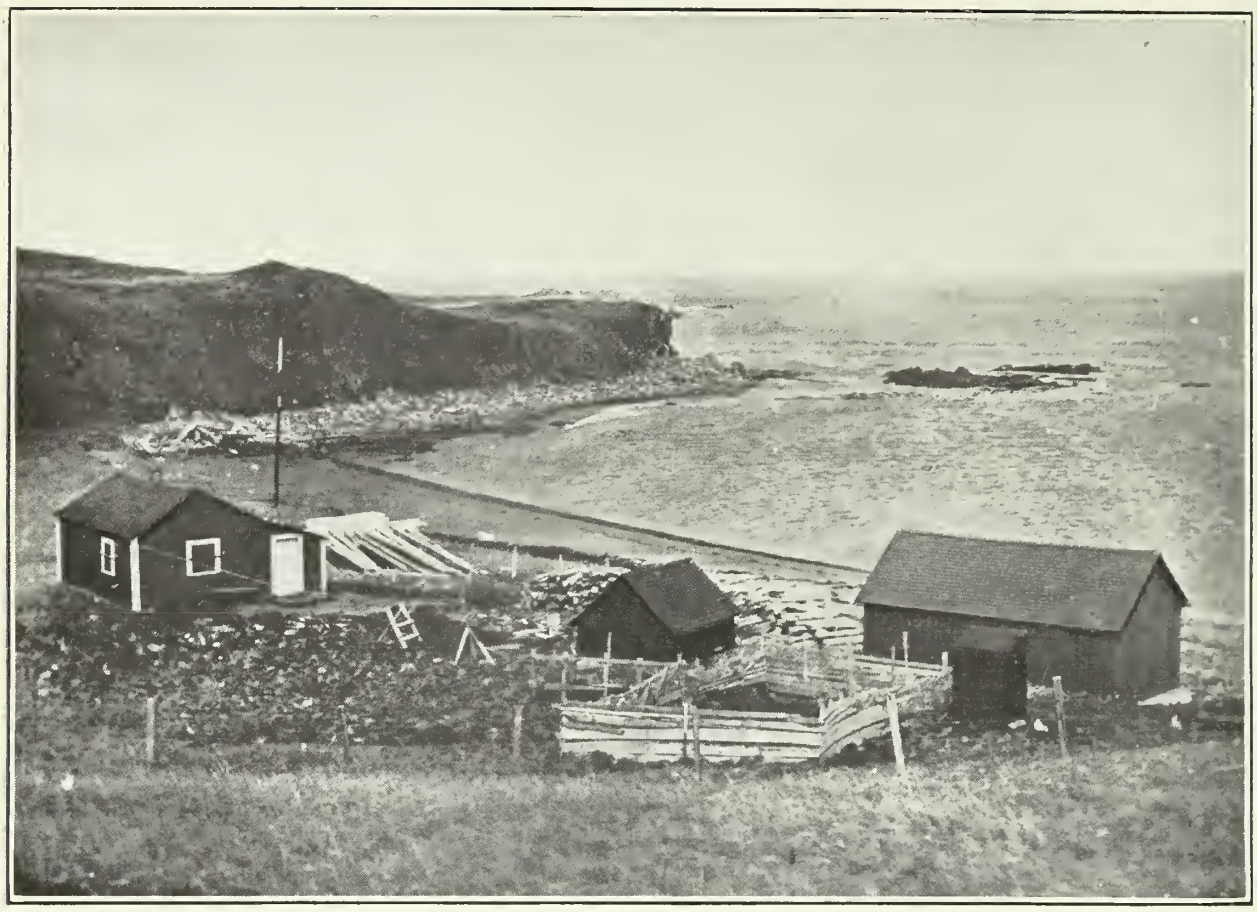

FIG. 1.—A COD FISHERMAN'S HOME ON SANNAK ISLAND, ALASKA.

FIG. 2.—THE TOWN OF UNGA, ALASKA, WITH THE ALASKA CODFISH COMPANY'S STATION IN THE FOREGROUND.

of the saloons to the stations it was a very easy matter for the men to get hold of all the liquor they wished, and carouses were frequent, lasting sometimes for weeks, as fresh supplies of liquor were continually coming in. Frequently, also, a fisherman would meet with an untimely end through the capsizing of his dory while returning in an intoxicated condition from a visit to one of these saloons, or be frozen to death or meet with a fatal fall while traversing the rough and slightly marked trails between the stations and the towns. In 1914 the judicial authorities of the third district, in which the codfish industry is carried on, refused to renew the old licenses or grant any new ones, with the result that the district is now totally free of the legalized traffic at least.

PERSONS EMPLOYED.

With the exception of the owners, a few of the higher officials ashore, and several of the captains but a small fraction of those engaged in the industry are native-born Americans. The large majority are of Scandinavian birth, with a few Finns, Germans, Canadians, etc. At the stations quite a few natives are employed as fishermen. No Orientals are employed except as cooks at the stations.

The captains and mates of the vessels are almost all men who have worked up from the ranks of the fishermen. Operating on the codfish banks of Alaska requires considerable local knowledge of the banks, of the prevailing winds, and also of the most convenient spots for shelter and for water. While the majority of them are good navigators, a few are sadly deficient in this respect, yet their knowledge of Alaska conditions enable them to make about as many successful trips as their fellows who are better grounded in the science.

The men in charge of the stations are generally fishermen who have worked up from the ranks. While some of these men are excellent workers, with considerable native shrewdness, yet as the necessities of the industry require their constant presence in Alaska, they get very little opportunity to keep in touch with the world's progress, and generally continue throughout their business life to carry on business in the same old groove in which it was running at the time responsibility fell upon them. They are also a very poorly remunerated class of men, with practically no opportunity for advancement beyond the position of station agent. This largely explains why the codfish industry of the Pacific coast is but little further advanced to-day, so far as methods of catching and curing the fish are concerned, than it was 40 years ago.

While a small proportion of the white men are excellent fishermen of the type required for hand-line fishing from dories, the majority of them are ordinary beach combers picked up on the

water fronts of San Francisco and Seattle, or men of practically no acquaintance with the sea even, let alone any fishing knowledge. The reason for this is that the salmon and halibut fisheries offer more congenial employment to the more intelligent and progressive of the fishermen. At the end of the salmon season in Alaska quite a few of the better class go to the shore stations and work there until the opening of the salmon season the following spring, when they take up the salmon work once more.

The natives generally are among the best of the station fishermen, as they are usually well acquainted with the locations of the many isolated spots which, while rich in cod, yet cover sometimes but a few feet or yards in extent and are difficult to find without certain landmarks being well fixed in the mind. They are persistent and skillful fishermen and generally are among the high-line fishermen unless handicapped through age, disease, or bodily infirmity. They are very apt to quit when the whim seizes them, but the author's experience with cod fishermen generally is that both whites and natives are apt to quit on very slight or no provocation at all, the desire for a change of scene at frequent intervals seeming, in their eyes at least, to be one of the essentials of the industry.

Quite a few of the white fishermen have married squaws, and for their accommodation the companies generally have small cottages or shacks scattered over the station grounds.

The use of nicknames by fishermen in order to distinguish each other is very common, and in many instances it is difficult to find out the real name of a man without having recourse to the station or ship records, and even here the records frequently show the nickname as part of his cognomen. These nicknames are derived in various ways, some being based upon the personal appearance or habits of the person so designated, while others are due to some incident connected with his life, still others to his place of birth, etc. Some are complimentary, while others are the reverse. Among the more prominent may be mentioned "Whiskey Jack," "Whiskey Bill" (in the first instance the excessive indulgence in this fluid led to the imposition of the name, while in the latter instance constant preaching of the merits of temperance caused it), "Dirty Dick," "Gentleman Gust," "Growling Pete," "Gloomy Gus," "Halibut Pete," "Northwest Bill," "Rolling Gus," "Redwood Gus," "Russian Bill," "Contrary Gus," "Stavanger," etc.

VESSELS AND BOATS.

Fishing vessels.—Unlike the vessels used in the New England fisheries, there is no distinctive type employed in the Pacific cod fishery. Not a single vessel now used exclusively in fishing was built especially for the purpose. All of them were at one time brigs,

FIG. 1.—UNION FISH COMPANY'S SCHOONER "PIRATE," ALASKA STATION, FISHING AND WORKING BOAT.

FIG. 2.—SCHOONER "MAID OF ORLEANS" AT ANCHOR ON SANNAK BANK IN THE NORTH PACIFIC OCEAN.

barks, barkentines, and schooners employed in the carrying trade of the Pacific and purchased for use in the fishery after they had attained varying ages. As the schooner rig has proven the most economical the vessels have gradually been altered until all are now of this rig. They vary in length from 102 feet 6 inches to 156 feet, and the net tonnage ranges from 138 to 413.

In Alaska a different type of vessel has been evolved. As the companies owning several stations frequently desired to transport goods and fish from station to station, small sailing vessels were employed in the early days. These were equipped with large cargo capacity and were vessels which had previously been used in California waters for various purposes. As the trips of these vessels were necessarily uncertain, owing to their dependence upon sails alone, it was soon seen that power vessels would be more profitable, and about 10 years ago the first vessels of this type were sent up under sail. In order to make them suitable for navigation under the trying conditions prevailing in this section of Alaska they were greatly altered, but even then proved far from satisfactory.

In 1912 the Union Fish Co., of San Francisco, had built on Puget Sound the first power vessel constructed to be devoted exclusively to the codfish industry. It was a schooner-rigged vessel and named the *Union Jack*. The vessel was 85 feet long, 18 feet beam, with a net tonnage of 39 tons. She was fitted with an 80-horsepower gasoline engine. As the owners had in view the using of this vessel part of the year in fishing also, they tried to adapt her for both purposes, with the result that she proved somewhat unsatisfactory for either, and was sold in 1913.

In 1914 the same company built another power vessel, the *Pirate*, to replace her. She is a two-masted schooner with knockabout rig and has a length over all of 64 feet 6 inches and a breadth of 21 feet. The hold is 6 feet 10 inches deep and 23 feet long, which provides a carrying capacity of 100 tons. The after cabin has accommodations for the captain and two men. The galley and mess room are also located here. The forecastle provides sleeping quarters for six men. The engine room is just forward of the pilot house, from which the main engine is controlled, thus permitting the captain to operate the engine as well as the vessel. The propelling machinery consists of an 80-horsepower engine, while a 9-horsepower windlass is used for handling cargo. It is the company's purpose to use this vessel in fishing during the summer months and in freighting in local waters the rest of the year.

Transporting vessels.—For a number of years the companies operating shore stations in Alaska have been utilizing vessels of the same type and size in fishing as in taking cargoes of supplies north to the

stations and in bringing back the fish caught by the station fishermen. Frequently the regular fishing vessels would be, and are still, sent north on this work during the winter season. As stormy weather with plenty of fog is the rule in the North Pacific Ocean, many of these vessels have met with an untimely end on the inhospitable shores in this region.

In 1913 the Union Fish Co., of San Francisco, had built a power schooner for this work. This vessel, which was named the *Golden State*, has a length of 145 feet, a breadth of 32 feet, and a depth of 11 feet 6 inches, and in addition to her engines is fully rigged as a three-masted baldheaded schooner. She has a carrying capacity of more than 500 tons.

The propelling machinery consists of a 150-horsepower four-cylinder distillate engine. It is connected to a two-bladed propeller through a disk clutch and spur-gear type of reverse. The two-bladed propeller is used in order that the blades may be placed in a vertical position when the sails are being used, and in this way the drag of an idle propeller is eliminated to a large extent. The engine is so equipped that it can be handled at slow speed with the ease characteristic of a steam installation.

The vessel has also a complete electric lighting plant with dynamo and two sets of bilge pumps and a force or fire pump, all run off a countershaft, which is in turn run either from the main engine or, when that is not running, is driven by a 4-horsepower single-cylinder engine installed in the engine room. Besides the quarters for its crew of 8 men, the vessel has cabin accommodations for 10 passengers.

Boats.—A considerable proportion of the dories in use with the fishing vessels and at the shore stations in Alaska were manufactured in New England and brought to this coast overland. A few of the coast boat builders are now manufacturing them after the eastern model. The hand-line dories are usually 14 feet long, bottom measurement. Occasionally trawl lines are employed, in which event larger dories must be used in order to accommodate the additional man needed and the extra amount of gear required. These large dories are usually 15 feet in length on the bottom.

A few years ago one of the companies began the use of line trawls at its shore station and employed round-bottomed sailboats of the well-known Columbia River type in working them. The trawling experiment was soon abandoned and the boats either sold or put to other uses.

During the season of 1914 the schooner *Fortuna* took north with her 12 portable engines suitable for attachment to the regular dories. These were sold to the fishermen and were to be paid for out of the

season's catch. The use of these engines did not prove satisfactory for a number of reasons, viz: The men generally knew nothing about their operation and care and grossly neglected them; the weight of the motor cut down the number of fish the dory could carry, while in rough weather, with the motor going and a load of fish aboard, the dory would ship heavy seas.

Small gasoline launches are beginning to be a factor in the Alaska station fishing. Some of these are dories, some Columbia River type of boats, while others are of nondescript types. Gasoline engines ranging from 2 to 12 horsepower have been installed in them. The chief disadvantage in the use of these is that the regular hand-line fishermen operating from dories refuse generally to permit the operators of these power boats to join with them in dressing the catch, and as a result they have to have a separate dress house, and unless there are enough of them to form a regular dress gang they find the business of dressing the fish rather laborious. Two or more men generally go in the power boats, and as they are enabled to go with perfect safety to the outer and less-worked banks, their daily catch is much larger proportionately than that of the regular hand-liners. The use of power also gives them a considerable advantage over the regular dory men, as they can go out in weather which would compel the sail and row dory to remain in port, and can go much farther away from the station and be sure of being able to get back again.

The number of these boats is increasing yearly, and it is to be hoped that they will continue to increase, as the owners of them are amongst the most industrious of the fishermen—men who do not waste all they make in riotous living, as is the custom with the vast majority of the fishermen. The larger companies have never encouraged the use of power boats, as they feared that in time the men operating them would become too independent and eventually become station owners themselves.

Nearly every hand-line fisherman carries a sail in his dory. The mainsail is usually of the leg-of-mutton variety. Some have a jib, while a few also use a staysail. The sails are generally made from sheeting, which is much lighter than canvas. Fishermen are expected to furnish their own sails, together with the necessary mast and boom. For a number of years the companies furnished the men with these articles, but so many of them failed to turn them in when paid off that they had to abandon the practice.

LAY OF THE CREW.

The methods followed in handling the catch and the lay of the crew are radically different from those on the Atlantic cod vessels. On eastern vessels the men catch and dress the fish and divide their share of the proceeds equally. On Pacific vessels the fishermen have

nothing to do with dressing the fish, this being done by one or two dress gangs (the number depending upon the size of the vessel), the members of which are paid monthly wages, which begin the moment they are signed on and ceases when the vessel returns to her home port. The fishermen are paid a certain sum (this varying with each man's known ability as a fisherman) per thousand fish. This price varies from $25 to $45 per thousand. Fish 28 inches and more in length are count fish; all under 28 inches in length count two for one. All fish must be bled by having their throats cut as soon as caught.

Under this arrangement the fishermen devote their entire working time to fishing, returning to the vessel only when a dory load has been obtained. In this way some of the fishermen will catch several hundred fish a day when good weather prevails. As hand lining is almost universally employed but one man goes in a dory.

A dress gang is composed of a splitter, header, throater, salter a man to remove the black skin, and from one to three others, called "idlers," who pew the fish as may be needed. When two gangs are operating some of the idlers do double duty and thus reduce the total number in the dress gangs. All members of the dress gang, and the cook, are encouraged to fish over the rail of the vessel, when not otherwise engaged, and for all fish so caught are paid the same sum per thousand as the majority of the fishermen receive.

The owners of the vessels furnish all provisions, fishing gear, boats and the bait taken along from the home port, the members of the crew not being required to furnish anything other than their clothing and bedding.

The captains of Puget Sound cod vessels receive as their lay from $3 to $3.75 (about $3.50 being the average) per ton for the fish brought home. On the San Francisco vessels the captains are generally engaged by the year and are paid a salary of about $150 per month.

The following represent the average monthly union wages paid the various members of the dress gangs: First salter, $90; second salter, $75; head splitter, $100; second splitter, $85; header, $35; throater, $35; idlers, $30; salt passer, $30; cook, $100; and cook's helper, $30. This scale of wages was fixed by the fishermen's union early in 1916 and is now in force.

The great increase which has occurred of recent years in the returns received by the more important members of the crew is well exemplified when it is stated that in 1895 fishermen received $2 per thousand fish; one salter, $65 per month; one splitter, $60; one cook, $55; four men to throat, head, and do the other dress work $25 each per month.

The following table shows the gross returns received by the two high-line fishermen of the principal vessels of the fleet, also the total

wages received by the splitter and salter of each vessel during the season of 1913. The high-line man on the *Chas. R. Wilson* received the largest amount of money paid to the individual fishermen, $753.05. The season of 1913 was not an exceptional one for this man, as he has exceeded this sum several times during the last 10 years, and it would be a difficult matter to find a cod fisherman operating in eastern waters who earned as high an average return for a series of years as has this man. Of the dress gangs, the splitter of the *Vega* received the largest amount in wages, $633.55. The second splitter on the same vessel received exactly the same amount as the first splitter. Both were former Gloucester fishermen, and the season just closed here was the first for each of them.

Schooner.	First fisherman.	Second fisherman.	Splitter.	Salter.
John A	$428.10	$388.88	$550.55	$542.21
Chas. R. Wilson	753.05	464.16	581.81	600.71
Alice	337.60	325.46	540.00	513.00
Maid of Orleans	580.00	556.00	560.00	500.00
Fanny Dutard	666.00	590.00	550.00	550.00
Vega	362.70	332.30	633.55	522.15
Galilee	352.15	342.80	584.05	562.70
W. H. Dimond	585.31	420.96	456.00	258.40
City of Papette	419.32	415..68	485.46	276.28

During the season of 1915 hand lines were used exclusively in fishing, but trawl lines, gill nets, and beam trawls have been used occasionally.

The hand lines are of special hard laid no. 72 untarred cotton seine twine. These are 7-pound cotton lines; i. e., one dozen 25-fathom lines weigh 7 pounds. Two to three of these lines are required to make one single fishing line, and each fisherman operates at least two fishing lines. Each line is generally fitted with a spreader, to which are attached two snoods. The hooks in general use are the no. 8 eyed japanned "Gravitation" and the no. 7 "Baylies." Most of the fishermen file down the long sharp point on the former hook. The leads weigh 5 pounds. No. 2 swivels are used in attaching the snoods.

Unlike his east coast brother, the Pacific cod fisherman worries but little about bait. Before sailing enough herring are taken along for a couple of days' baiting, but the fisherman usually gets enough shack fish the first day to furnish him with plenty of bait for the next day, and so on throughout the season. Sculpins, halibut, porgies, octopus, salmon, etc., form the principal sources of bait supply. In baiting the hooks the fish are slivered, steaks being cut from each side of the backbone. These are cut into three-cornered or square pieces, and are strung upon the hooks to the number of six to eight. Octopus is the favorite bait, a boat load of fish frequently being secured with pieces cut from one tentacle of this

mollusk. Although clams are abundant in Alaska, the fishermen rarely ever bother to dig them for bait.

SEASON, METHODS, ETC.

The vessels generally leave their home ports between the middle of March and the middle of April, and arrive in the neighborhood of the Shumagin Islands, in the North Pacific, in from two to three weeks after sailing. The Shumagin Islands are approximately 1,553 nautical miles from Seattle and approximately 1,903 nautical miles from San Francisco.

As there is floating ice on the cod banks in Bering Sea at this time, most of the vessels fish off the southern side of Unimak Island. The early part of May some of the vessels move over to the southeast point of Sannak Island and spend the greater part of the season on the Sannak Bank, but the majority of them go into Bering Sea, where fishing is usually begun in Dublin Bay and on Slime Bank. Toward the latter part of June the Bering Sea fleet begins to work north onto Baird Bank, moving along by Port Moller and up as far as the mouth of the Ugashik River and occasionally, but not often, up into Bristol Bay proper.

The vessels which fish exclusively in the North Pacific Ocean sometimes spend the early part of the season on Shumagin Bank, working later on the Sannak Bank. A few start fishing at Cape Pankof, off the southern side of Unimak Island, as stated above, and work thence onto Sannak Bank, where they finish the season.

One great advantage the Pacific fisherman has over his Atlantic brother is that he does not lose any time because of enemies of the cod driving them off the banks, as is the case in the East, where vessels are sometimes tied up for weeks on account of dogfish. While the dogfish is to be found in Alaska waters, it is not in sufficient abundance to become a pest.

All Pacific codfishing is done in the daytime. Owing to the high latitude of the banks and the fact that the vessel fishing season is the summer time, when the hours of daylight are most numerous, the hours of darkness rarely exceed four and are even less during June and July.

Early in the morning the dories are put over the sides of the vessel, which has been anchored in a favorable spot. Each dory is equipped with the necessary fishing lines, a small sail, a water beaker, a windlass for hauling in the anchor, a 10 or 14 pound anchor, a small keg buoy, a knife for cutting bait and bleeding the fish, a gaff for handling the large fish and with which most of the fishermen stun or kill the fish by striking it on the head with the handle.

But one man goes in a dory, and each rows away in search of a good place to fish. The direction in which they row from the vessel is, to a great extent, governed by the tide and force of the wind, the idea being to utilize the wind and tide to help in getting back to the ship when the dory, being full, would make rowing laborious. As the fish seem at times to be quite numerous in small, isolated areas, considerable luck enters into the fishing. When one of the fishermen is perceived to have good success his mates are apt to gather around and try their luck on the same spot. The men return to the vessel about noon, or sooner if a dory load has been obtained. After obtaining their dinner they go out again, and sometimes a trip will be made after supper. Each man's catch is counted as he pews them inboard upon his return to the vessels.

While the fishermen are out on their first trip of the day the members of the dress gang are usually fishing over the rail of the vessel, and some of them do this whenever they have a few spare moments. These men are paid a fixed sum (usually an average of the prices paid the fishermen) for all fish so caught, which is in addition to their regular wages.

Trawl lines.—But little trawling has ever been done by the vessels fishing on the Alaska banks, and none by those fishing on the Okhotsk banks. In 1888 the schooner *Arago*, belonging to Lynde & Hough, of San Francisco, employed trawl lines on the Bering Sea banks, but the fishermen claimed that the fleas (amphipod crustaceans) devoured or injured the cod so badly that their use had to be abandoned.

But few efforts in this line were made by the vessels of the fleet until in 1913, when the schooner *Vega* and the power schooner *Union Jack*, belonging to the Union Fish Co., of San Francisco, used trawl lines for a considerable part of the season. On the *Vega*, which fished on the outer banks off the Shumagin Islands, the ground line of the trawl was of 20-pound tarred cotton. The gangings, which were about 3 feet in length and set about 6 feet apart, were of 9-pound tarred cotton. The hooks used were of the 10/O japanned Limerick brand. The trawls were coiled in tubs made by sawing barrels into equal halves. Each dory crew was expected to have rigged up 42 trawls of 50 fathoms each, but under ordinary conditions would rarely ever have in the water at one time more than 14, one-half of the balance being baited and ready for use, while the rest were held in reserve in case of emergencies.

Around the edges of the top of the cabin of the vessel were nailed boards. When ready for the first baiting the fishermen dumped the bait onto the top of the cabin and then stood in the gangways and cut up the bait on the boards, and as fast as the hooks were baited

the line was carefully coiled in a tub with the baited hooks in the center of the coil. Only one piece of bait, and that not a large one, is put on a hook.

The buoy line used was of 6-thread manila. At the surface the ends were marked by 10-gallon buoy kegs, painted red, and attached to the buoy line by swivels similar to those used for this purpose by the halibut fishermen. On rough bottom the ground line would be buoyed up by glass balls attached at intervals. Twelve or fourteen pound anchors were attached at each end of the trawl.

In the bow of each dory was fixed a roller working on a pivot, over which the ground line was hauled, in order to facilitate bringing it in. There are always two men in a dory when a vessel is trawling, one man to haul the line and shake the fish off, which he does by a dexterous twist of the wrist, while the second man baits the hooks and coils the gear in the tubs again. The men usually brought the trawl in when returning with the catch, but sometimes when the weather looked propitious the line would be underrun, the fish removed and new bait substituted, and allowed to fish again while the men took their catch aboard. Sometimes the trawl would be set out late in the evening and allowed to remain down until the men went out early in the morning.

The trawls were handled in the same manner as on the Atlantic coast. In setting a trawl two men go in a dory, one to throw the trawl and the other to row the boat. Having arrived at the place where the set is to be made, a buoy is fastened to one end of the buoy line and thrown over the side, the buoy line allowed to run out until the end is reached, when it, together with the upper end of the trawl line, is bent to the ring of the anchor. The anchor is then lowered over the side, and the trawl thrown from the tub until the lower end is reached; it is then fastened to the upper end of the second tub of trawl, and so on until all of the tubs—two, three, or more—have been set. The last end of the trawl, together with the second buoy line, is bent to an anchor and thrown over the side, care being taken to prevent the buoy line from fouling with hooks of the trawl as it is thrown out. To the free end of the buoy line is attached the second buoy. The method of "underrunning" a trawl permits the removal of the fish from the hooks and rebaiting them in a single operation, thus saving a considerable amount of labor. "Underrunning" is sometimes performed on ground where fish are plentiful and the weather is suitable for such operation. A trawl intended to be "underrun" is set in the usual manner with slight variation. A becket is made in the buoy line about 10 or 12 fathoms below the buoy. In the becket is bent a small line which reaches to the bottom, and to the bottom end of this line is fastened a stone weighing about 6 pounds. The ground line of the trawl, instead of being fastened

to the ring of the anchor, is attached to the small line close to the stone. When thus set there is sufficient distance between the anchor on the buoy line and the stone on the small line to permit of the trawl being lifted without disturbing the anchor. In hauling, the buoy line is pulled up until the small line running to the anchor is reached, the stone is hauled up, and the end of the trawl is passed over the dory. One man unhooks the fish and the other baits the hooks. In this way the dory passes under the entire length of the trawl, the fish taken from it and the hooks baited in a single operation. The object of operating trawls in the manner described is for the purpose of keeping them in one position during the time fish are plentiful.

On sandy bottom the fish are sometimes eaten by sand fleas, and to prevent this glass balls attached to the ground line at frequent intervals keep the fish clear of the bottom, where the fleas are most numerous.

While the use of trawls by the *Vega's* crew was found to be quite successful, so far as catching fish was concerned, the difficulty of pairing off congenial fishermen and the finding of men who were familiar with the operation of trawl lines proved too much of a handicap, and in the latter part of the season hand-lining was resorted to.

A very important advantage in the use of trawl lines is that the men will fish with them in much deeper water than they will with hand-lines. The largest and best cod are found in the deeper waters, and it is from these that the owners would like the bulk of the catch to come, but the men when hand-lining either refuse openly to work in the deeper waters, or else secretly neglect the fishing and bring in but few fish when the captain insists upon anchoring on the deeper portions of the banks.

The experience of the *Union Jack* in trawling is described under the section devoted to shore stations.

For some years trawl lines were in general use by the station fishermen, but were eventually given up because large quantities of gear and fish were lost through the men being unable to get out to the banks in stormy weather and because the fishing required more skill than was possessed by most of the green hands available.

As the ground upon which they could fish was somewhat limited for trawl lines, the fishermen would first agree amongst themselves as to how the ground should be apportioned out. In setting the trawl line two men would go in a dory, but in fishing it the work would be done by one man, as the trawl would be allowed to remain on the ground for at least a week, and sometimes longer. Before setting the trawl the bottom would be carefully sounded with a hand line in order to be sure of getting the right spot for fishing. An anchor and

line with buoy attached would first be dropped overboard, then the ground line would be paid out in such direction as had been agreed upon with the other fishermen, after which the other anchor and buoy line would be set. The ground line was left sufficiently slack that it could be hauled to the surface without disturbing the anchor, but not slack enough to permit of the line snarling. In fishing it the fisherman would go to the leeward buoy, haul up the bight of the line until it lay across the bow of his dory, then by hauling on this line would pull the dory against the tide in the direction of the other anchor, the line passing across the bow of the dory so that the hooks which came in one side were freed from fish and rebaited and thrown over on the other side of the dory until the trawl had been completely underrun or the dory filled with fish, when the line would be thrown off again and the trawl left set as before. The ground line of these trawls was 9-thread manila, while the buoy lines were of 6-thread manila, commonly known as "dory rode." The gangings were of 6-pound lines, i. e., 12 lines of 25 fathoms each weighed 6 pounds. They were 22 inches in length and were attached to the ground line at intervals of 3 feet. The number of hooks used varied from 500 to something more than 1,000, according to the number of tubs set.

During the season of 1913 the small power schooner *Union Jack*, which had its headquarters at the Pirate Cove station of the Union Fish Co., engaged in trawling on the inshore banks of the Shumagin Islands, mainly in West Nagai Strait.

As it was the intention later in the season to use the *Union Jack* in gill-net fishing for cod from the deck of the vessel by means of a net lifter (described elsewhere in this report), the machine was placed on board at the beginning of the season with the hope that it could be used in hauling trawl lines.

The process of tarring seemed to weaken the lines. Untarred lines were used for renewals and were found to be much stronger and more durable.

Both 32 and 20 pound cotton tarred lines were used for ground line, while the gangings were of 6-pound tarred lines. Experiment developed the fact that 20-pound lines were amply heavy and strong enough for the work and that untarred cotton lines were more durable and stronger than tarred lines, the tarring seeming to weaken the line. In the last experiments the gangings were each about 5 feet long and were attached about 6 feet apart, this being necessary owing to the high freeboard of the vessel.

Only a couple of skates of gear were rigged for experimental use with the machine. After being baited these skates were coiled on movable plank platforms about 5 feet long by 2½ feet wide. Placing one of these at the stern of the vessel, an experienced man could pay

FIG. 1.—MACHINE USED FOR HAULING IN COD TRAWLS.

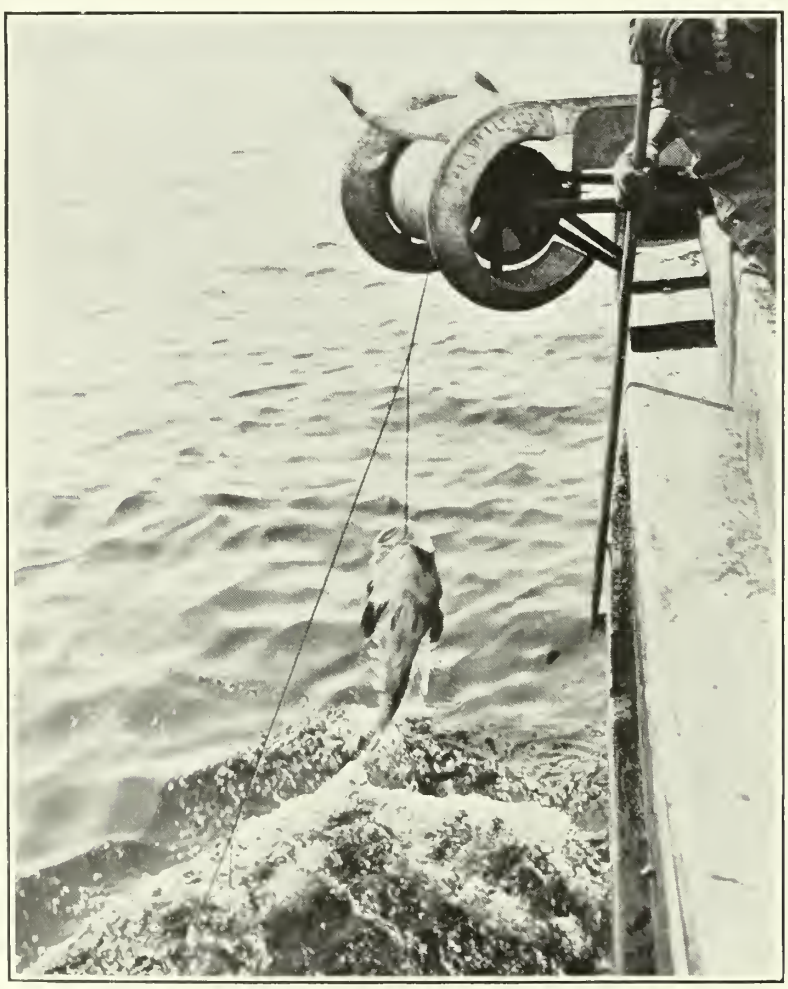

FIG. 2.—COD TRAWL LINE HAULED BY MEANS OF NET LIFTER ON DECK OF VESSELS.

out the line by means of two short sticks (a method followed by the Norwegians) in order to prevent the possibility of the hooks catching in a man's flesh or clothing, as fast as the vessel could steam. An anchor and buoy was at each end of the trawl and it was set with the tide.

After being down a couple of hours the vessel came up to the leeward buoy in order to haul against the tide. The buoy was first hauled in by hand. The buoy line was then slipped under the fingers of the net lifter, the engine started up, and the line reeled in at full speed. When the anchor appeared the machine was stopped, the anchor lifted inboard by hand, and the end of the trawl placed under the fingers and the machine started again. Of the crew, one man ran the engine, one stood along the rail just aft of the machine with a long-handled gaff, ready to gaff cod which might break loose from the hooks, another stood just back of the machine itself and shook as many of the fish off the hooks as he could, while two other men removed and killed the balance of the fish and coiled down the trawl as it came from the machine, and attended to other work.

The vessel used for the experiment was not well suited to the purpose, owing to its slow response to the rudder—a serious handicap, as it is necessary for the vessel to be kept well over the line at all times and thus relieve it as much as possible from strain—and the high freeboard, owing to which a number of fish were lost because of their weight causing them to break loose while traversing this long distance; but despite this the experiment indicated clearly the value of the machine in hauling trawl lines from the deck of a suitable vessel.

As experienced fishermen were not available for carrying on power trawling from the deck of the vessel, the crew trawled by hand from dories during the rest of the season and met with good success. In operating from dories the trawls were rigged in the same manner as on board the *Vega*.

Gill netting.—In the summer of 1913 the author carried on some experiments in gill netting for cod in the waters adjacent to Pirate Cove, in the Shumagin Islands, Alaska. No originality is claimed for this method, as for a number of years gill netting for cod has been carried on in Ipswich Bay, Mass., and at a few other places along the New England coast, while about three years ago some of the Great Lakes fishermen visited Gloucester with their steam tugs and engaged in gill netting for cod, haddock, and pollock on a large scale. For a number of years the Great Lakes fishermen have carried on in those waters important gill-net fisheries for lake herring, trout, and whitefish. Steam tugs have been almost universally employed, and from 5 to 10 miles of netting set at one time. The use of this immense quantity of netting was made feasible by the employment

of a patented power device, known as a net lifter, for hauling in the nets.

The net lifter is a circular machine fitted along the outer rim with a number of fingers. The mechanism operating these fingers moves on tracks, and is so arranged that the fingers take hold as they come opposite the rail of the vessel and let go when they have completed about two-thirds of one complete revolution from the point where they first gripped. By this means the net is grasped by the fingers as it comes aboard, and after being carried about two-thirds of the way around is released and allowed to drop on the deck. A framework extends from the lifter outboard, and at the outer end is a roller, while a sheet-iron trough for the passage of the net and fish runs from the roller to and partly around the machine and rests upon the framework. The machine is operated either by a small gasoline engine or directly from the main engine.

The net lifter is generally set on the port side, forward of the fore rigging, although it will work about as well when set on the starboard side, or when close aft of the fore rigging.

At my instance the Union Fish Co., of San Francisco, with its usual progressiveness, purchased the necessary number of gill nets for an experiment on a moderate scale, a net lifter, and a four-horsepower Imperial engine to operate same.

The gill nets were 125 yards long each and made of 12/3 cord linen. A specially made line was used for head, foot, and side lines. The nets were of $7\frac{1}{2}$-inch stretch mesh and were 15 meshes deep. The floats, which were made of white cedar, were 2 inches by 5 inches, and had been soaked a number of times in boiling linseed oil in order to make them waterproof. Fifty of these were used to the net and were hung from the cork line and not strung on. The leads, which were $3\frac{1}{2}$ inches long, with a diameter of thirteen-sixteenths inch, weighed 7 ounces each, were made to close on the line and not strung on, and were set opposite the floats.

As the nets were primarily for use during the winter season, when the spawning cod are on the inshore banks, the work carried on during the summer was merely preliminary and mainly for the purpose of accustoming the men to their use.

Boxes with flaring tops, so that they would nest, were constructed, and in these the nets were stowed, with the lead line at one end and the cork line at the other; these boxes would hold about four nets each.

When ready to set the boxes were arranged on the after deck, and as the vessel steamed along the anchor, buoy, and buoy line were thrown overboard, and the nets were then paid out by two men, one handling the cork line and the other the lead line. Another man bent on a new net when the previous one had almost run out. After

all had been set they were held and marked by another anchor and buoy. The nets were set across the tide and as much as possible in the shape of a crescent.

While most of them were set on the bottom, a few were elevated slightly by means of glass floats. Almost invariably, however, the nets raised above the bottom caught no fish.

In hauling in the net a great deal depends upon the captain. In order not to put too much strain upon the nets or the machine, the vessel should be kept as nearly as possible over the former, and in certain kinds of weather and at certain stages of the tides this requires careful maneuvering on the part of the navigator.

The nets were set out in the evening and were taken up at as early an hour in the morning as possible, as the flesh of the cod will discolor if the fish are not bled soon after dying. Steaming up to the first buoy this was taken aboard. The buoy rope was then slipped under a couple of the raised fingers on the net lifter and the engine started. As soon as the fingers gripped the rope no further handling was necessary, except to coil it aft of the machine as it was reeled in at full speed. When the anchor appeared it was lifted aboard by hand and the head and foot lines of the net were then joined together, thus doubling the net over, and placed under the fingers and the engine started again. But few stops were necessary, and then only when a large skate would be found in the net, as the cod, halibut, and other fish passed along the trough around the machine without any trouble. A man with a gaff was stationed just aft of the machine, and his duty was to gaff all fish insufficiently meshed and apt to fall out of the net as it was lifted from the water. Other men received the net from the machine, shook out the fish, and stowed the former back in the net boxes.

An odd feature of the experiment was the comparatively large number of halibut caught in the few nets set one day. In one haul with 10 nets 180 cod and 60 halibut were taken, the halibut ranging in weight from 5 to 30 pounds. No halibut were taken in the other trials with gill nets, while none at all were taken in the course of the trials with trawl lines.

Ashore the nets were run onto large reels, and here they were dried and mended with a minimum of expense. The reels were so nicely adjusted that a child could turn one even when laden with four or five nets.

When in regular use it is the intention to have the nets divided into three sets. One of these will be in the water, one will be aboard the vessel, while the other will be ashore. All mending and drying of nets will be done ashore, the fishermen having nothing to do with this part of the work.

While the machine will work upon the codfish banks profitably, either with gill nets or line trawl, it is probable that the principal use of the machine in the near future will be in the salmon and halibut fisheries of Alaska. With one of these machines placed upon the deck of a cannery tender a crew of not more than five or six men could set out and haul in from 5 to 10 miles of gill netting in a working day, and do this in weather too rough for a Columbia River boat to live in. The gill nets at present in use could be changed at very little expense so as to work in the machine, and the work could be carried on much more cheaply than is the case under present conditions. With the use of a large power vessel gill netting could be carried on in the open bay or sea if the owner so desired.

In the halibut fisheries the use of the lifter would permit of all the trawl fishing being done from the deck of the vessel, thus doing away with the dories, and with it fishing could be carried on except during the more violent storms.

DRESSING THE FISH.

As soon as enough fish have accumulated on the deck the dress gang begins its work. The "throater" seizes the fish by the head in the left hand, places the back on the edge of a table or tub, and by means of a short knife with pointed end makes a cut each side of the throat just behind the gills (the front of the throat has previously been cut by the fisherman in order to bleed the fish) and another slit is made from the belly to the vent. The "header" then receives the fish, and, grasping the head and body, backward pressure is made across the edge of the table or tub, resulting in breaking off the head at the first vertebra. He then opens the belly with the left hand and tears out the viscera. It is then passed on to the "splitter," the most important member of the gang, who places the back of the fish against a cleat on a board and by means of a short, heavy knife, rounded at the end, and with the blade slightly curved flatwise, continues the split down the belly to near the end of the tail, care being taken to keep near the backbone. At about three-fifths of the distance from the neck to the tail the backbone is cut across, and is loosened so that he can catch the end in his fingers. Grasping this with his left hand he cuts under it toward the head of the fish and separates the upper part of the backbone from the fish. In this operation the knife blade is kept close to the backbone to prevent loss of flesh, and a good splitter will drive the knife no deeper than is absolutely necessary, as otherwise the thick flesh at the back would be almost cut in two, thus spoiling the fish for middles. The sounds are not saved, and it is but rarely that the livers are saved on the vessels.

The fish are then passed to the "black skinner," who, with an old glove or a piece of bagging, rubs off the nape skins or membrane covering the napes, also any blood spots, and then drops the fish into a tub of salt water. Here the fish are soused around until thoroughly clean by the lesser members of the gang, who are called "idlers," when they are removed and passed through a chute into the hold, where the "salters" receive them.

The salters lay the fish on their backs with napes and tails alternating, with the exception of the top layer, which is turned back up. A liberal sprinkling of salt is thrown over each layer, an especially heavy portion being put on where the fish come in contact with partitions or the sides of the vessel. The kenches are about 4 feet deep and extend from side to side of the vessel and the full height of the hold. The first kench is usually started in the forward part of the hold and the salter works toward the after part. As the kenches settle additional fish are placed on top to keep the compartment full.

A great deal depends upon the thoroughness with which the work of salting is done, as it is important that every part of the fish shall receive a share. If the salting is well done, it is not often that the fish need to be rekenched; but if the salt is used too sparingly or is unevenly applied, souring may start, which necessitates moving whole kenches and resalting. Sometimes the effort is made on the Atlantic coast to salt a little slack in order to make the fish heavy on reaching port, with the result that the whole catch may be lost. Slack salting, owing to the length of the trips and the fact that the fishermen would not benefit because of the increased weight of the fish, is rarely ever attempted on this coast. As the fish lose their water from salting it runs to the bottom of the hold and is pumped out. About 21 sacks of salt (weighing 100 pounds each) are used to 1,000 fish when in kench.

Soured fish have a peculiar odor, not very different from that of sauerkraut. Those accustomed to handling the fish become expert in recognizing this trouble and pick out the infected fish instantly.

Much is said by the fishermen about the practice of dressing the cod on the banks and throwing the gurry overboard, claiming that the gurry decays on the bottom and the taint drives the fish away. As sand fleas (amphipod crustaceans) are very abundant on the inshore and offshore banks, these scavengers, along with the sculpins and other bottom feeders, speedily remove every particle of edible meat from the gurry, thus removing every possibility of the water becoming polluted. At the various stations, should a couple of days' stormy weather prevent fishing, the sand fleas will be found to have almost caught up with the accumulation of gurry, while at the seasonal stations a month after the season closes the usual large pile

of gurry has been reduced to a comparatively small heap of bones absolutely cleaned of all flesh.

SHORE-STATION METHODS.

The methods followed by the shore stations are somewhat different from those on board the vessels.

The shore fishermen usually arise between 3 and 4 a. m. in summer and between 4 and 5 a. m. in winter. After getting breakfast the men row out to the near-by banks in their dories. From 9 to 12 they come straggling in with varying numbers of cod, the latter depending somewhat upon luck, but mainly upon the knowledge on the part of the fisherman of the "good spots" and the persistency with which he fished. The dories in use will hold from 180 to 220 fish, the number depending upon their size. A dory with the greater number could be handled only in calm or fairly calm weather, as it would be so low in the water as to ship a sea at every lurch in rough weather.

Upon reaching the station the fish are pewed by the fishermen from the dory into a box located on the side of the wharf and midway between the top and low water. From here the fish are pewed onto the dress-house floor (the dress house is either at the end of the wharf or midway of the same), the agent or his representative keeping the tally as the fish are thrown upon the floor.

In the bunk house is hung a board ruled so as to show the name of each fisherman and his catch from day to day, and as soon as all the boats are in the agent fills out on this board the catch of each man for that day, thus giving the men an opportunity to know just how they stand and to have any corrections made should they be necessary.

Dinner is at 12 o'clock, and shortly after the fishermen gather at the dress house and, dividing themselves into as many dress gangs as their numbers will permit, begin the work of dressing. No special dress gangs are employed at the stations, this work being considered a part of the fisherman's regular work.

That portion of the dress gang in the dress house is generally composed of a "throater," "header," "splitter," a "black skinner," a man to go over the fish and remove adhering backbones, clots of blood, portions of black skin, etc., left by those who had previously handled it, and a man to pew the fish into the throater's box. The duties of these men are about the same as on the vessels. Each dress gang is equipped with a box set up on legs and with a sloping grid-iron bottom, so that water, slime, etc., will pass out through the bottom. In this box the fish are placed with their heads toward the throater. Alongside and attached to this box is a table. The header stands at the end next to the box, on the opposite side from the throater

FIG. 1.—LANDING THE DAY'S CATCH AT THE SHORE STATION.

FIG. 2.—DORIES NESTED AND DRESS GANG FINISHING UP THE DAY'S CATCH.

and splitter, and has in front of him a piece of iron fastened to the edge of the table, over which he breaks the backbone of the fish as they are passed to him. At the other end of the opposite side of the table stands the splitter. In front of him has been inserted in the top of the table a piece of wood about 15 inches long and about 10 inches wide. In this has been driven a sharpened nail, to which the fish are attached, so they will not slip away while he is splitting them, the board inset being for the purpose of obviating the necessity of renewing the whole top of the table after the splitter has cut and chopped here for a short time.

There are usually two or three gangs at a station, and, in addition to the above, there are usually two men who trundle the dressed fish in large wheelbarrows to the butt house, where two salters receive and salt them in the large tanks.

During the summer months the livers of the cod are saved and dumped into large casks just outside the dress house, this work being done by the header. Here they are allowed to rot out. The oil gradually comes to the surface and at intervals is dipped out into barrels or drums. No attempt at present is made to prepare medicinal oil, although the Union Fish Co. has a plant for this purpose at the Pirate Cove station. As the healthy and diseased livers are used together, only oil suitable for use in the arts is rendered at present.

The offal passes through chutes into the water under the dress house, from whence it is either washed away, rots, or is devoured by gulls and sand fleas. At some stations the latter are so numerous that in a surprisingly short space of time the bones of the fish are polished clean.

The salting houses are long, low structures, with but few windows, which leaves them usually in deep twilight. They are generally arranged with two rows of square or round tanks, with a passageway between them for the wheelbarrows to pass in and out. The large square tanks hold about 4,000 medium-sized fish, while the large round ones hold about 3,000 medium-sized fish. These tanks are generally made of redwood staves or planks held together with metal hoops or bolted together with iron bolts. At a few places small hogsheads are employed. These receptacles frequently are in use for years.

Before the dressing begins each salter brings from the salt house about the number of bags of salt he expects to use. This is usually figured on the basis of 17 sacks (holding 100 pounds each) to 1,000 fish. The quantity used varies, however, with the weather and the fatness of the fish.

The fish are carefully placed in the butts in layers, face, or flesh, side up. Salt is sprinkled over each layer, care being used to see

that every part of the fish is covered. The layers are carried from 18 inches to 2 feet above the top of the butts, so as to allow for the settling which will occur as the water is drawn from the fish. No pickle is necessary on these fish, as they make their own. When the fish have settled below the top of the butt, which they will do in a few days, several layers of new fish are added. In Alaska the pickle in the butts is kept usually at from 87° to 97° salinometer test, the average being about 90°. As the climate in Alaska is nearly always cold and damp, there is but little danger of fish spoiling if ordinary care is used. Fish will keep indefinitely in strong pickle so long as they are covered with it. If kept for a long time the pickle must be added to occasionally to repair the losses, particularly from leakage. At the stations the fish at the top of the butts are usually inspected every few days. When the pickle begins to weaken the top layer is turned backs up and a few bags of salt laid on top. These press the fish down, and, the salt being in the bags, it dissolves much more slowly than if thrown loosely over the fish.

At a few stations where the salinometer is not in use the agent depends upon the use of a potato to determine when the pickle is strong enough. If the potato floats at the surface of the pickle it is strong enough for curing cod.

The pickle forms very rapidly in the early stages of the curing, and the surplus is allowed to escape at intervals through a bunghole in the butt.

Care must be taken to see than the roof does not leak during the heavy rains, as should fresh water drip into the butts the fish will become slimy.

Should the run vessel be delayed and a station become filled to its butt capacity, a space is usually cleared in the salt house and the fish taken from the first filled butts and kenched on the floor, a little salt being sprinkled between the layers and over the top. Every effort is made to hold them in the butts as long as practicable, as they retain their natural white color much better when in pickle, kenched fish usually acquiring a yellowish color.

When the station vessel arrives the pickle is allowed to run off the fish, and they are pewed out into carts and wheeled along the dock to a point opposite the vessel's hatch, where they are dumped into a chute and pass thence into the hold, where men receive and kench them in the same manner as on the fishing vessels, almost no salt being used, however, as the fish are already well cured and also have a considerable quantity of salt adhering to them.

At stations where the vessels can not lie alongside the dock, owing to shoal water, the vessel is usually anchored in the bay or harbor, and the fish are brought out to it in dories, which are loaded from

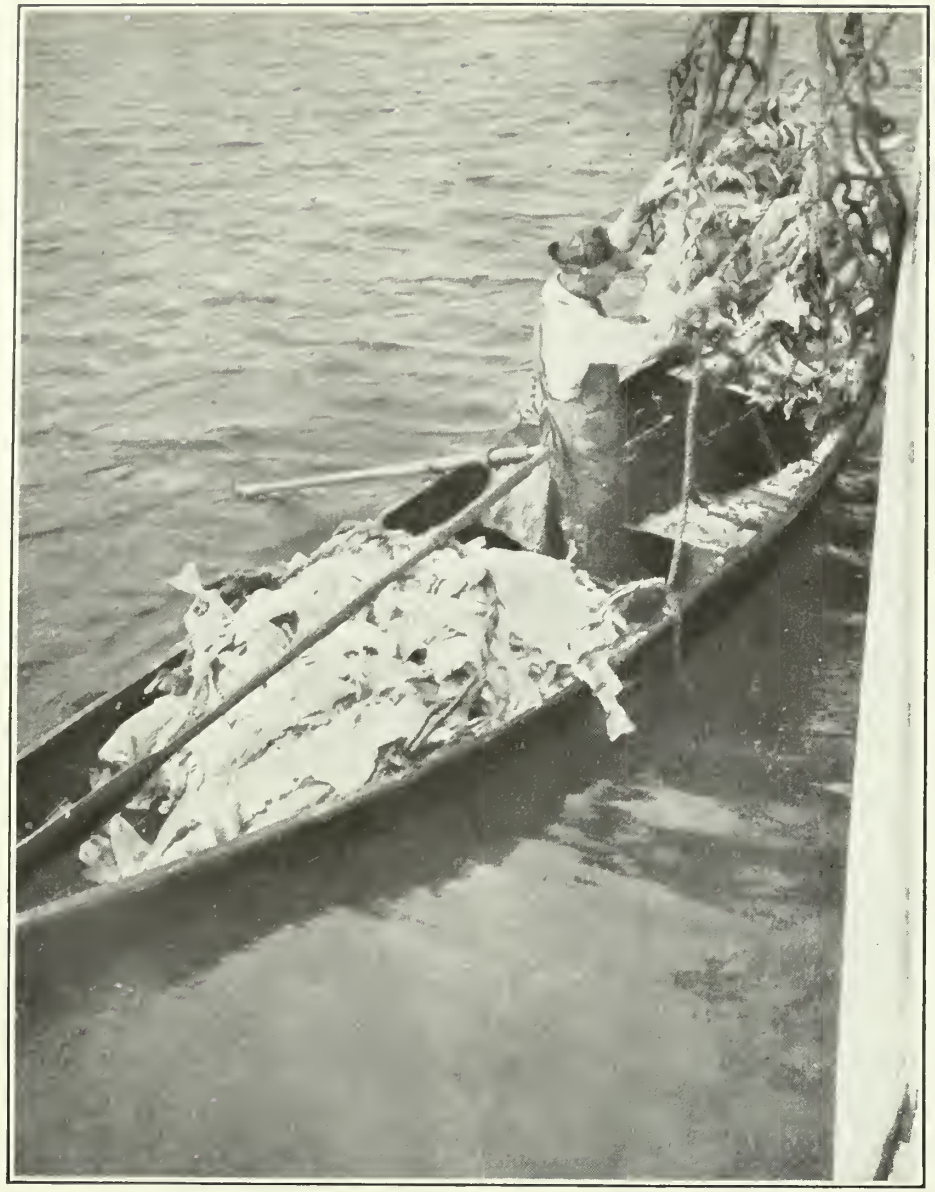

FIG. 1.—LOADING CODFISH ABOARD THE TRANSPORTER BY MEANS OF NETS.

FIG. 2.—NATIVE BOY CUTTING OUT COD TONGUES.

a chute rigged up at the outer end of the dock. When a dory is full it is rowed out alongside the vessel and the fish pewed over the rail. As the vessel's rail is a considerable height from the surface of the water when she first begins loading, it is generally necessary to rig a stage about midway between the surface of the water and the top of the rail. The fish are then pewed onto this stage, whence one of the crew pews them over the rail onto the deck, where another man pews them into the hold. This method is very expensive, as it requires a large number of men, is quite slow, and also injures the fish through the excessive number of times that the pew is driven into them.

In 1912 one company had square rope nets made similar to those used by cargo vessels in handling small packages. A small one is placed in the forward end of the dory and a larger one in the after end, space for the boatman to stand being left between the nets. The fish drop from the chute into these nets. When the dory arrives alongside the vessel the cargo hook is lowered over the side. The four corners of the net have been drawn together at the top and these are slipped over the hook, the vessel's donkey engine started, the net with its contents lifted over the rail and lowered into the hold, where it is emptied by catching the hook in the meshes at the back of the net and starting the engine again. As the net comes up it is emptied, after which it is swung over the side and lowered into the dory, when the operation is repeated with the other net. By this method a vessel is loaded in about one-third the time previously required, while but few fish are lost alongside the vessel owing to carelessness in pewing. Another advantage is that it is not necessary to pew the fish after they are thrown into the carts.

There is a considerable loss of fish in passing them from the dock to the dory, especially in rough weather, when the dory is bobbing up and down like a cork. The use of chutes with closed sides and built-in sections, so that they could be lengthened or shortened as the tide ebbed or flowed, would save a considerable part of the present wastage from this cause.

If the net method is not employed the best way would be to have medium-sized scows for transporting the fish from the dock to the side of the vessel. With these the waste would be almost negligible, as they would be so much larger than the dories that practically no fish would be lost overboard while the scow was pitching and rolling in the swell alongside the dock, and owing to the greater weight and size of the scow the work of loading could be carried on in weather too rough for dories to work.

WASTAGE IN THE INDUSTRY.

There is much more waste in the Pacific fishery than in the Atlantic, and this is due mainly to the different methods of arranging the fishing lay. In the Atlantic fishery every man has an interest in the catch, and it is to his advantage to utilize every portion of the fish, thus increasing the total value of the fare, which will mean a larger share for himself in the final division. In the Pacific fishery the fishermen are paid a certain sum per thousand for fish running over a certain size and a less sum for fish under that size. On the vessels the fishermen have nothing to do with dressing the fish, this being done by a separate gang, who are paid regular monthly wages. At the shore stations the fishermen dress their own fish and are paid a certain sum per thousand for all caught. As a result of this arrangement the Pacific crews resent doing more than merely catching and dressing the fish, and they even skimp the latter part all they possibly can.

Livers and tongues.—As they receive no pecuniary benefit from the saving of livers and tongues, they naturally make no effort to do so unless compelled to by the owners. In dressing the fish at certain stations the header is expected to tear loose the liver and drop it into a bucket, which, when full, is dumped into the liver butt; but even at these stations probably not one-fifth of the livers available are saved. At some stations and on certain vessels an extra boy is engaged, whose business it is to cut out tongues, for which he is paid from $3.50 to $5 per barrel, and his board.

Sounds.—Several times efforts have been made to cut out and save the sounds, but the men have always asked such a high price per hour for the work, and so few would be secured in an hour's time, owing to the difficulty in cutting them loose and the general disinclination of the cutter to work, while their thinness made it necessary to cut out a large number in order to fill a barrel, that the cost of obtaining them was out of all proportion to the selling price.

Cod roe.—During the winter and spring the cod are spawning in Alaska, and as large quantities are captured by the station fishermen at that time, cod roe is exceedingly abundant. The roe of the cod is an excellent food product, but except for a few served to the men in the mess houses no use is made of them. They could be preserved, either by pickling or freezing, and a possible market found for them in this country.

In the Atlantic fisheries large quantities are prepared as "rogue" and shipped to France, where it is used as bait in the sardine fisheries. In preparing "rogue" the roes should be soaked for some days in old brine and then packed in strong casks holding about 25 gallons each.

Heads and cheeks.—To many, a cod head, well cooked, is the choicest part of the fish, but unless one is at a shore station or aboard one of the vessels when fishing, it is impossible to get one. If some one were to bring heads down to the coast States in brine he could doubtless build up quite a market for them. As nearly all of the nutriment is in the lower half of the head, a small band saw could be installed, and the upper half of the head, which is bony and contains but little nutriment, cut off and thrown away, and only the lower part, which contains the fleshy cheeks and the succulent tongue, saved. When glue and fertilizer plants are established at the stations, as will doubtless be done in the near future, the upper part of the head, which is rich in glue, could be used for this purpose.

Should it not be considered desirable to save the heads, the cheeks (a good-sized piece of choice flesh on each side of the head) could be cut out and preserved. Halibut cheeks, which are no more choice than cod cheeks, are always to be found in our larger coast fish markets.

Bones.—Fish bones are coming into quite general use by preparers of chicken food. These people grind up the fish bones, and, mixing them with other ingredients, have an excellent food for chickens. At present it does not pay to ship the bones, owing to their lightness as compared with their large bulk, but machines for grinding the bones could be introduced and the powder obtained shipped profitably.

Salt.—A large amount of salt is thrown away annually because of the belief amongst packers generally that salt once used in pickle, though not dissolved because of the excess employed, becomes exhausted. That this is not true can readily be demonstrated by dissolving it in water and testing it with a salinometer. While it might not be desirable to use it a second time in the salting tank it could be washed and used in curing snappers and other fish which are to be marketed in a pickled condition.

PREPARING COD FOR MARKET.

As soon as a fishing or station vessel reaches its home station the fish are landed and put into long troughs filled with water, where they are cleaned with brushes. They are then put into butts in the storage houses, backs down, except the top layer, salt being sprinkled between each layer, the amount used depending upon the degree and length of salting on the vessel. On top of the pile is placed about half a bushel of salt to strengthen the weak pickle which floats up to the surface. If the fish have been but lightly salted on the vessel, one or two bags of salt are laid on top of the fish and the salt allowed to melt gradually. The fish remain in the butts under shelter until

orders are received, which may be a year or more; in that case more salt being added from time to time; but the sooner they are used after the first few weeks the better, otherwise they have a tendency to turn yellow. Sunlight will also turn them yellow, so every effort is made to keep the storage house in deep shadow. The butts are either immense hogsheads or square tanks made of bolted timbers, and are used over and over again for years.

The curing of salt fish depends upon drying, and this is accomplished in three ways—by the use of salt, by pressure, and by exposure to the air, either in the open air or in a drier. On this coast all three agents are employed.

When the fish are taken out of the butts they are piled in a kench or water-horsed to drain off part of the brine and to give the fish a smooth appearance. The fish are stacked face down, with the exception of the lowest layer in contact with the rack, in kenches about 4 feet high. If there is urgent demand for them, they are left in this condition for 24 to 48 hours. If more time can be allowed, they are repiled at the end of the first or second day, so that the fish on top may go to the bottom and be subjected to pressure to squeeze out part of the water. If the weather is unfavorable for drying the kench is repiled every second or third day, and this may be continued for 10 days or more. With full-pickle fish, such as prepared on this coast, it is not necessary to kench or water-horse so thoroughly as in the case of slack-salted or hard-dried fish.

From the water-horse the fish go to the flakes, which are of two kinds, stationary and canting, the former being the more common. The flake consists of a lattice bed about 8 feet wide, 30 inches high, and as long as the requirements may demand. The lattice used on this bed is made of triangular strips 1 inch on the base, placed about 3 inches apart. The fish therefore rest upon a sharp edge about every 4 inches, this giving the maximum circulation of air about the fish. The canting-flake frames, of which there are a number in use on this coast, are fixed only at the middle and to a horizontal axis, so that they can be turned at an agle with the horizon, in order to expose only the edge of the fish to the sun and to get the benefit of even a slight breeze. They are practical only in yards running north and south.

Rectangular boxes, with peaked roofs, known as "flake boxes," are used for covering the fish, when gathered together in small heaps, from dampness or rain. This box is generally 38 inches long, 22 inches wide, and 14 inches high, the whole being made of $\frac{3}{4}$-inch rough boards.

The fish are spread out carefully on the flakes with the face side up and the drying is continued as long as may be necessary for the particular grade of fish. The full-pickle fish are dried for the shortest period, as they can not be skinned readily if too dry, and, furthermore, the trade seems to desire fish which are moist and not too hard, and these retain practically 50 per cent of their water. If the sun is fairly warm and there is a good breeze, the drying can be accomplished in about 10 hours as the minimum time, but this may be greatly increased with unfavorable weather conditions. Only one drying is usual for the full-cured fish.

Fish intended for Porto Rico, or export, are usually kenched directly from the vessel and not placed in butts. When needed they are dried for three days, "sweated" for two days, then again dried for two days. The object of the sweating is to bring the moisture out of the interior of the fish. The drying on the flakes removes the moisture from the surface and crystallizes the salt, but to get the moisture out of the center of the meat the fish must be piled in the kench, where the dry salt takes up some of the remaining moisture, so that the second drying on the flakes has a greater effect. The export fish are usually dried sufficiently hard to withstand the pressure of the thumb in the thick part of the flesh without retaining the impression. The full-pickle fish lose about 9 per cent of their weight in drying on the flakes. When cured they retain about 50 per cent of their moisture, and the hard-dried from 25 to 30 per cent.

The sanitary conditions around a flake yard must be carefully looked after, as otherwise flies will breed and cause fly-blowing on the slack-salted fish.

Nearly all of the home stations on this coast have large artificial driers. These consist of inclosed rooms in which there are shelves of hot-water pipes, above which trays of fish are placed, and the air is made to circulate over them by means of a large fan. These dry kilns are used chiefly in the drying of export fish. During foggy and damp weather and in winter when sunlight is rare they are used frequently.

After the fish have been dried they are carted to the storeroom and kenched until packed for shipment.

If the fish are to be boned and skinned they are taken to a separate room. Here the operator first cuts off the dorsal and ventral fins, then starts the skin at the napes and pulls it in toward the middle of the back and then toward the tail. If the fish has been properly cured the skin can be stripped off clean without tearing the flesh. The tail is then cut off, after which the fish is turned over and the nape bones removed with a small iron gaff called a "bone hooker." The remaining portion of the backbone is cut out and the pectoral

fins cut off. If it is to be put up as "absolutely boneless" the fish is passed to the bone pickers, who remove with forceps the ribs and any pieces of bone left in the body. If the fish are to be packed as so-called "boneless," then the fins only are cut off and the thick part of the backbone cut out closely, the small pieces of the fins, ribs, and backbone being allowed to remain.

In making "bricks" or blocks the fish are then cut to the desired size on a table made of blocks with openings between them at regular intervals. The fish, sometimes as many as eight or nine, are laid one on top of the other on the cutting table so that the best parts come between the openings. Then a long-bladed knife is driven through them and they are ready to be packed into bricks, etc. A trough, or miter box, is also used for securing the same result.

The pieces of fish are passed to girls, who sort them and weigh out exactly a pound or 2 pounds, whichever the weight of the brick is to be. Two good slices are selected to make the outside of the package and short or narrow strips to make up the middle part. The weighed fish is passed to the brickmaker, who selects, first, the piece which will make a whole side and an edge, and places it in the galvanized-iron mold; the smaller pieces are then put in, and lastly the remaining large piece to make a side. The selecting and placing of the pieces in such a way as to make the best appearing cake is quite a knack. The mold, which is 6 inches long by 3 inches wide and $3\frac{1}{2}$ inches deep, is pressed tightly by foot or hand power, held for a few seconds, and then strings, which had previously been placed across the bottom of the mold in grooves left for the purpose, are tied around each end. The package is then completed by wrapping in paraffined or parchment paper with recipes and other matter printed on it. Some packers wrap in the parchment or paraffined paper and then inclose in a lithographed wrapper. There are several grades of bricks, depending upon the appearance and color of the fish, the choiceness of the pieces used, and the special curing to which the fish was originally subjected. Twenty-four 1-pound, twelve 2-pound, or twelve 3-pound bricks make a crate or case. The "boneless" fish put up in 5-pound boxes, but not pressed, run 12 to a crate.

Several forms of presses are used in this work, the most common consisting of a sliding box having two or three compartments, each of the size desired, and so arranged that a hand or foot lever forces a block down in one compartment at a time. The pressure remains while the fish are being placed in the second compartment, and when it is released the box is slid along until the second compartment comes under the press, when the brick in the first compartment is removed.

FIG. 1.—CUTTING STRIPS FOR THE MAKING OF COD BRICKS.

FIG. 2.—MAKING COD BRICKS.

Shredded codfish, known as "desiccated codfish," "fibered codfish," "flaked codfish," and "skriggled codfish," is made up from the trimmings not otherwise used in packing the regular tablets, and is prepared on this coast by only one company. The material used is as good as any employed, but the pieces are too small to be used in the regular brick. It is run through a machine which tears the muscle into small fibrous bundles. In order to get this very fine and fluffy it may be necessary to press out part of the water after the first treatment and run it through the machine again, and then sift it to free it from all particles of bone. The shredded fish is put up in 5 and 7 ounce cartons and jars, the latter being hermetically sealed in vacuum. Twenty-four boxes or jars make a crate.

A considerable quantity of skinned cod is put up in 100-pound cases. These are divided into "Large whole," "Extra large whole," and "Eastern style." These cases contain some of the finest of the whole cod cured, and the grade is fixed by the number of fish in the case. The last named are packed in eastern wood and are supposed to most nearly resemble the eastern fish of the same size and style of preparation.

The Porto Rican export, or hard-salted fish, are packed in drums, boxes, and bundles to suit the order, but there are regular drums for 50, 100, 200, 300, and 448 pounds. The 448-pound drum is used very largely in the Porto Rican trade. The fish packed in drums are all well dried.

When placed in drums the fish are carefully arranged in circular fashion, with the flesh side up, until several layers have been put in, and then a layer is placed backs up. The fish are then well tamped with a heavy wooden tamper. Fish are again added and the tamping repeated at intervals. When the last fish are finally piled on the drum they will extend several inches above it, and a ratchet or a hydraulic press is necessary to force them down so that the head can be put in.

During the winter months a small business is done in preparing bacalao for the San Francisco trade. Usually this business is controlled by eastern packers who use the very small haddock in preparing it. Occasionally small haddock are not available from eastern waters during the winter season, and it is then that the Latin-speaking peoples of California fall back upon the local packers for their supplies. Small snappers, of which there is never a large supply on this coast, are used, and the fish are hard dried and then packed 100 pounds in a drum. It is fortunate that the business is not more extensive on this coast, as it means a heavy drain on the young cod, which if allowed to live a year longer would be much enhanced in value.

Large quantities of cod are sold after having been water-horsed and packed in bundles weighing 50 and 100 pounds. These fish are not skinned. A considerable trade in this grade of fish is had with the Hawaiian Islands.

Skinned fish are also put up in strips and middles. The strips consist of one-half the fish split down the middle and are cut to suit the trade—some left whole and some with more or less of the nape and thinner portion at the tail cut off in order to get heavy pieces. These are put up usually in 20 and 40 pound boxes. The middle is the whole fish after being skinned and the napes and tail cut off; how much of the napes and tail is cut off depends upon the number of middles permitted in a box of a certain size. They are quoted usually by the size—8 to 10, or 10 to 12, in a 40-pound box. They are also packed in 60-pound boxes. Frequently each individual fish is cut transversely the width of the box and folded over itself. Thick fish are sometimes cut transversely and each piece split and folded over in such a manner that the clean cut appears outside. The fish are also sometimes cut transversely across the fiber and tightly packed in boxes with the fiber running perpendicularly.

The trade in brine-salted codfish on the Pacific coast is small, and is confined exclusively to the small fish or snappers. In pickling, the fish are dressed, split, washed, and salted in butts in the same manner as has been heretofore noted in preparing dry-salted cod. When shipment is to be made the fish are removed from the butts, cleaned with brushes, and placed in tight half barrels, flesh side up, except the top layer, which is placed back up, the fish being bent to follow the curve of the half barrel. It is important that the fish be not repacked until thoroughly struck, otherwise the flesh will be marked with yellow spots caused by contact of the imperfectly cured fish with each other. Salt is placed at the bottom of the barrel and over each layer of fish, from one-half to three-quarters of a peck being used to each half barrel of fish. The barrel is then headed and strong brine added through the bunghole. About 38 medium-sized snappers are required to fill a half barrel. Most of these fish are sold to coasters plying up and down the coast and are fed to the crews.

The station fishermen frequently prepare a cod delicacy which they enjoy very much. Selecting a suitable cod stomach, the fisherman will carefully clean this inside and out. Several fresh, healthy cod livers are then picked out, chopped fine, and mixed with a little flour and vegetables; the stomachs are stuffed with this mixture, after which they are cooked like sausages.

Stockfish.—Of recent years a considerable business has developed in the preparation of stockfish. Two small shore stations in the Shumagins devote a considerable portion of their energies during

the colder portion of the year to this work, while a few individuals occasionally have put up varying quantities.

In preparing stockfish the fish are split in the regular way to a spot a little below the vent. The backbone is then removed and the fish split into two equal halves as far as the first cut extended. Snappers are sometimes merely gutted.

The drying yard comprises a network of wires running from crosspieces nailed onto uprights. The fish are hung over these wires, flesh side in, and supported by the undivided portion of the tail. Here they are allowed to cure in the sun and wind, no salt at all being used, sometimes for as long as six or seven weeks, the length of time depending upon how much moisture there is in the atmosphere. During long-continued rains the fish are stored under cover, but it does not hurt them to remain out during ordinary rains. When bone-dry the fish are stowed away in dry, cool houses, and when shipped are bound by wires into bales.

This work is carried on in winter, which is the only season when comparatively dry, cold weather is experienced in the Shumagins. In shipping and storing these fish great care must be exercised to see that they are not placed in a damp room, or that anything damp comes in contact with them, as in that event they will become slimy.

Fish prepared in this manner will keep for a much longer period than when prepared by any other method. It is much practiced by the Norwegians.

When desired for the table a sufficient number are put to soak in water and remain there four to five days, the water being changed every day. When of the desired softness the fish are put in fresh water with some lye and allowed to remain about 24 hours. The lye cuts the slime from the fish and gives it an added flavor.

Tongues.—Cod tongues are saved whenever possible. On the vessels one of the dress gang usually cuts them out, while at the stations some one other than a regular fisherman usually does this work. A cod's tongue is attached to the lower jaw, and when cut out includes all that part of the jaw lying inside the jawbone. When cutting tongues the operator takes hold of the fish by the back of the head, using the eyes for finger holds. As he lifts the fish by the head its mouth usually falls open, then with his other hand he cuts the tongue loose on the sides with a sharp knife, then cuts loose the lower end along the curving bone forming the back part of the lower jaw. The tongue is then hanging by a thin strip at the forward end of the jaw, from whence it is torn loose by the hand. The tongues are cured loosely in barrels with salt, and after being thoroughly struck are packed in barrels holding 200 pounds, which are headed up, after which a strong brine is added through the bung. They are sold in

these barrels or else repacked in half barrels, pails, and kits. Some are mixed with sounds and sold as tongues and sounds. As no sounds are saved on this coast, eastern sounds are employed in packing the latter.

Codfish tongues, especially when fresh, are considered a great delicacy. They are thoroughly washed in order to clean them, then dried with a clean cloth, rolled in bread or cracker crumbs, and fried the same as oysters. The salt tongues can be prepared in the same manner after having been thoroughly soaked in fresh water.

The packers never overstock with codfish tongues if it can be avoided, as in a year or two part of the tongue hardens, thus making it practically worthless as food.

Canning.—On the Atlantic coast a considerable quantity of cod is canned annually under the name of "codfish flakes." An even greater quantity of hake, haddock, and cod are canned together under the name of "fish flakes." The opportunity for canning cod is especially good on the Pacific coast. Several of the salmon canneries are located in close proximity to the cod banks, and as these plants already have the machinery and employees needed for carrying on this work in addition to the canning of salmon, cod could be canned much more cheaply than if a plant had to be erected especially for the work. As no other members of the Gadidæ other than the true cod are available on the Pacific coast for this work, the product could be sold under a cod label, which would considerably enhance its value.

Cod-liver oil.—At an early date in the fishery oil was being extracted from the livers of cod. In 1866, 10,000 gallons were reported as being rendered, which statement seems somewhat of an exaggeration when the then extent of the fishery is taken into account. In 1879 Lynde & Hough are reported as bringing to San Francisco 3,000 gallons of oil. In later years a small quantity was prepared each season, the quantity depending upon the demand and price.

All the oil prepared was by means of rotting the livers in large vats or hogsheads, and the resulting product, after being strained, was shipped in this condition.

In 1899 the Alaska Codfish Co. installed a refining plant at its Kelleys Rock station, in Alaska, and operated it successfully until 100 barrels (iron-lined receptacles holding 20 gallons) had accumulated, when they were brought to San Francisco and the oil offered for sale to makers of emulsion of cod-liver oil. At that time the market was overloaded with this grade of oil and the best price offered was about what the container cost, so the oil was stored and the plant shut down. A few years later the market picked up and the oil was disposed of at $22 per barrel. In the meantime the com-

pany's oil maker had disappeared and the plant was so badly dilapidated through the action of the elements that the industry was not resumed.

Later the Union Fish Co. installed a plant at Pirate Cove, but after refining a small quantity at no profit to the company, this plant was also shut down and has remained so ever since.

At present the small quantity rendered is shipped just as taken from the rotting tank, except that it is first strained.

Glue and fertilizer.—As early as 1893 a plant was started in California for the purpose of manufacturing glue from codfish skins and other refuse of the packing plants in the States. The material remaining after the glue had been extracted was prepared and sold as fertilizer. There are now two plants at Anacortes, Wash., and one in California which prepare glue in whole or in part from cod.

It is to be hoped that in the near future small plants for the manufacture of glue and fertilizer will be established at certain centrally located stations in Alaska, where the large quantity of heads, entrails, and spoiled fish can be utilized and not, as now, thrown into the water under the dress houses, where they pollute the water, while the bones remaining after the flesh has rotted away are gradually filling up the smaller harbors.

USE OF PRESERVATIVES.

In 1881 boracic acid was introduced as a preservative in the fish industry and was used continuously until 1907, when it was quite generally superseded by sodium benzoate. Boracic acid is but rarely employed on this coast at the present time, and when so employed it is on export fish. If this acid is used it is applied to the fish when they are being shifted in the water-horse or to the outside of the completed brick.

Sodium benzoate is almost solely the only preservative used on this coast. It is mixed with finely ground salt and applied by means of a powdering can like a large pepper box. It is used upon the fish in the storeroom if the weather conditions demand it, but its principal use is upon the fish as they are being weighed out into tablets and bricks. This preservative is used chiefly during the warmer months. The amount used is not weighed, but is dusted on to cover the whole surface, the effort being to apply from 0.3 to 0.4 per cent. When this preservative is used the package of fish bears the following label or stamp: "Sprinkled with one-half of 1 per cent soda benzoate. To remove, soak out in fresh water."

Preservatives are never used upon fish shipped to near-by points or if the fish are to be consumed very shortly after being shipped. Its use is generally upon fish shipped abroad, or fish shipped considerable distances in this country during the summer months.

MARKET FOR PACIFIC COD.

The development of the demand for Pacific cod has been one of slow growth against great obstacles. In the early days of the industry all of the catch was marketed on the coast, and as salt fish was scarce and in good demand, fairly good prices were obtained for an article which, in many instances, was only indifferently cured. The success of the pioneers led to a rapid expansion of the industry, with the result that the local market was soon overstocked and the curers had to look to the Middle Western and Eastern States and abroad for a market for the surplus.

At this period the eastern curers, and the large wholesale salt fish houses scattered throughout the country who purchased their supplies from them, controlled the markets for cod throughout the United States, while all of the cod exported from this country went from New England. Naturally these curers, and the wholesalers dependent upon them, did not welcome the intrusion of Pacific cod, and while they were unable to prevent the loss of the greater part of their trade on the Pacific coast, they fought hard for the rest. Dealers and consumers were told in some instances that the fish prepared by this coast's curers were not cod, or that they were a very inferior grade of cod; that the fish would not keep, etc. That these misstatements had a wide dissemination and made a considerable impression is evidenced even to this day in the prejudice which is met with in different sections of the country against Pacific cod.

Unfortunately, the Pacific coast producers, through ignorance, played right into the hands of their trade enemies when first invading the territory hitherto held by them alone. Some of the fish were poorly prepared and part of them were shipped across the continent during a season when the weather was warm, and as they had been stowed in ordinary box cars, the temperature of these corresponded to the weather, so that the fish arrived in the eastern market in very poor condition, thus disgusting the few dealers who had been willing to give them a trial. The shippers quickly discovered their error, and afterwards restricted shipments for long distances to the colder months of the year and also used refrigerator cars. The damage had been done, however, and from then on it was slow and discouraging uphill work extending the market for Pacific cod east of the Rocky Mountains.

The fight of the Pacific cod for admission into eastern markets is a typical example of how difficult it is to overcome a prejudice, no matter how insufficiently founded.

On the Pacific coast but one species of the Gadidæ, the true cod, or *Gadus macrocephalus*, is to be found of a sufficient size for dry-salting, and, as a result, is the only species sold in any condition other than fresh. At the very time the dealers were refusing Pacific

cod, and for a number of years after, the vast majority of them were purchasing from eastern curers hake, cusk, and pollock, closely related species to the true cod, but much cheaper, and, in the opinion of those best informed, much inferior to the true cod, and selling these as true cod along with the cod itself. The advent of the pure-food law compelled the dealers to sell the fish for what they really were, and as a result the market for the Pacific cod has been rapidly widening since.

Being shut off from Europe and the east coast of South and Central America by high freight rates and the great distance the fish had to travel, the Pacific dealers directed their efforts toward Mexico, the west coast of Central America, the islands of the Pacific, and Asia with most gratifying results. At one time a large business was done with Australia, until that Commonwealth enacted a stringent law prohibiting the use of preservatives on shipments into that country of salt fish. As the goods had to pass through the Tropics on their way to Australia, and the Australians are not accustomed to using hard-cured fish, heavy losses through fish spoiling resulted from this prohibition and the market there has been much curtailed as a result.

Despite the natural and artificial handicaps under which the industry suffered a considerable trade has been developed in the West Indies, and this has been much enlarged since the European war broke out, the Norwegians, who formerly shipped large quantities to this section, have found a new market in Germany. The opening of the Panama Canal has also greatly aided in the expansion of the trade in this section of the world.

The Asian market will undoubtedly in time attain to large dimensions. At present, and for a number of years back, it has been steadily widening as the fish became better known and the means of transportation increased.

Hawaii consumes large quantities of cod and the greater part of this comes from the Pacific coast. San Francisco dealers ship nearly all of the bundle fish (fish which have been water-horsed and put into bundles of 100 pounds each and bagged) and a considerable part of the cased cod, while the Puget Sound dealers ship mainly cased fish.

Mexico is rapidly developing into an excellent market for Pacific cod, mainly for cased fish which have been harder dried than for consumption nearer home.

The increase in steamship lines to South and Central America, due to the opening of the Panama Canal, will greatly aid in the widening of the markets for Pacific cod in that region of the world.

The demand on the part of the public for dried cod is not what it ought to be, and a good part of this lack of demand is due to the

archaic methods of doing business prevalent not only in the Pacific cod industry but also in that of the Atlantic.

If the shippers of codfish were to copy somewhat the methods followed by the meat packers they would have less loss from spoilage, while the fish would present so much nicer appearance that the demand for it would materially increase. The only difference between salted meat and salted fish is that the latter is less liable to spoil.

When shipping to the Atlantic seaboard the dealers usually select the season from November to March and load the fish in refrigerator cars. The latter are cooled but little during the shipment. In shipping lesser distances the fish are usually stowed in ordinary box cars. Sometimes these box cars are shunted onto sidetracks and held for days at a time, and should the temperature rise above 65° F. during this period and under these conditions reddening is apt to appear.

The better plan is to have cold-storage depots located in trade centers. The fish could be shipped in refrigerator cars to these depots frequently, where they could be put in storage. The retailers could then be encouraged to order the fish in small lots, say enough to last for a week or 10 days, and thus they would always have on hand comparatively fresh fish.

In their eagerness, however, to do business the jobbers frequently overload the retailer, with the result that the fish dry out to such an extent that the salt crystallizes upon it and the fish presents an unattractive appearance, while if the temperature rises above a certain point reddening is apt to occur should conditions be ripe for it.

Grocery stores are the chief handlers of cod, and but few of them are properly equipped for doing this. It is but rarely that a customer who enters one of these stores will see dried cod on exhibition, or, if he does, it is usually whole fish jumbled up in a case and presenting an unattractive appearance. Usually the fish is kept in a back room or the cellar and is brought out only when the customer orders it. As many customers are in an uncertain frame of mind as to what they want when they enter a store, and usually decide after a glance over the visible stock, it follows naturally that but few ever order salt cod, and, owing to the extra labor involved in bringing the cod from the back room or cellar, the clerks rarely ever call the customer's attention to its existence.

If the retailer fitted up a small refrigerated show case with glass sides and top, somewhere in the store proper, he could not only keep in this his dried cod, especially the bricks, tablets, middles, etc., which could be tastefully arranged on china trays, but could also display a number of other articles which require to be kept in a cool place and which are usually sold in grocery stores, such as smoked fish, pickled fish, etc.

With the fish displayed thus prominently before the customer, his attention is at once attracted to it, and he is much more liable to purchase it than if the product were kept out of sight and only produced when a customer called for it.

The greater part of the bricks and tablets are now wrapped in white parchment paper with the brand and a little lettering printed on it in a neutral tint. A few of the more progressive dealers wrap them in the parchment and then inclose the package in an ornately lithographed wrapper. The latter makes a very attractive appearance, and undoubtedly aids in calling the attention of the consumer to the product, particularly if it is displayed as recommended above, as is the case in a few of the high-class delicatessen stores. An even better method would be to pack the bricks and tablets in lithographed cartons made to hold certain sizes. On one side recipes for cooking and preparing the fish should be printed; if the fish is improperly prepared by a cook unfamiliar with it, those who partake of it are not apt to want it again.

COMPARATIVE ANALYSES OF PACIFIC AND ATLANTIC COD.

Much has been said and written as to the alleged superiority of Atlantic over Pacific cod. While there are a number of analyses of Atlantic cod extant, the same, unfortunately, is not true of the Pacific cod. The only one available is that made for the Robinson Fisheries Co., of Anacortes, Wash., and the subject was a sample of shredded Pacific cod. Fortunately, there is one analysis of Atlantic shredded cod with which it can be compared. The analyses follow:

COMPARISON OF PACIFIC AND ATLANTIC SHREDDED CODFISH.

	Pacific cod.[a]	Atlantic cod.[b]
	Per cent.	*Per cent.*
Water	43.90	46.52
Protein (calc. from nitrogen)	37.19	30.85
Protein (calc. from differences)	35.00	.....
Fat	.73	.33
Ash	20.37	22.81
Phosphoric anhydride	.69	.....
Sulphuric anhydride	.07	.....
Chlorine	11.37	.....
Fuel value per pound ..... calories (calc.)	682	578

[a] Analysis made by Stillwell & Gladding, New York, N. Y.
[b] Foods and Their Adulteration, by Dr. Harvey W. Wiley, p. 126. Philadelphia, 1907.

REDDENING OF COD.

A source of considerable expense and annoyance to the codfish packers is the occasional reddening of the fish. While not so common on the Pacific coast as on the Atlantic and European coasts, due to the much lower mean temperature during the warm months and possibly the grade of salt used, yet it does appear at times.

Codfish and some other salt-cured fish are subject to spoilage when exposed to a temperature above 65° F. The spoilage is manifested by the surface of the fish turning red and emitting a foul odor. This is an old complaint on both coasts and in Europe, and has been increasingly expensive on the Atlantic coast, as the expansion of the industry has necessitated the marketing of greater and greater quantities of fish during the warm months of the year. It appears only on the dry-salted fish, as fish completely submerged in pickle seems to be immune so long as it is retained there.

The first sign of redness appears when the dried fish are stored on the ground floor and before the skinning and packing are done, but frequently it may not appear until many days after the fish has been packed and shipped.

Reddening is essentially a surface infection. Except as it follows fissures in the muscles, cuts, or breaks where the air has free access, it does not appear below the surface. On the whole fish, the favorite point of attack is near the backbone, and this is due to the greater thickness of flesh, which insures more moisture at all times. It is more often found upon the outside of the bricks or tablets.

Sometimes the affected fish is of a pale, pink color, at other times a bright red. Experiments have disclosed that the pink is caused by the germs being in a thin layer on very moist fish; the more intense color appears when the fish is drier and the germs form thicker spots or a series of colonies. In the latter stage the germs have a moister and more oily appearance, although both conditions may appear on the same fish. The redness may occur on either the skin or the flesh, or both, but is not so readily seen nor developed on the skin. So far as known, the infection occurs on the salted fish only, but as the germs have been found in water used to wash the fresh fish, it is possible they would develop on fresh fish should they be kept sufficiently long for the color to appear. As cod are not marketed in a fresh condition on the Pacific coast, this possibility does not concern our fishermen.

Cold checks the growth of the organisms causing the reddening, and in addition it also has the effect of bleaching the color which may be present.

This reddening of cod has been studied by a number of scientists.[a] As yet the source of infection causing the red discoloration has not

[a] On the nature of the peculiar reddening of salted codfish during the summer season, by W. G. Farlow. United States Fish Commission Report for 1878, p. 969–974. (1880.)

Vegetable parasites of codfish, by W. G. Farlow. Bulletin United States Fish Commission, 1886, p. 1–4, 2 fig. (1887.)

Observations on the red flesh of the codfish, by A. Layet. Bulletin United States Fish Commission, 1887, vol. 7, p. 90–95. (1889.)

Preparation of the cod and other salt fish for the market, including a bacteriological study of the causes of reddening, by A. W. Bitting. United States Department of Agriculture, Bureau of Chemistry. Bulletin no. 133, 63 p., ill. (1911.)

Edington: Report of the Fisheries Board of Scotland, 1887.

Jordan: Massachusetts State Board of Health Report, 1890, vol. 2.

been fully determined, but it is probable that the normal habitat of the organisms is in the salt water and lowlands along the coast, and, being saprophytic, they will grow upon the salt fish when brought in contact with them. This seems to be borne out by the fact that the organisms can grow freely upon fish or wood that is salty to any degree, and even upon the surface of salt crystals. Salt acts as a preservative by preventing the growth of most organisms, which would cause spoilage in foods, but it has no such effect in this case.

The finding of the organisms on the salt in the hold of a steamer and on the salt in the storehouses is evidence that it must have been infected where it was produced. The salt used is solar-sea salt, the salt beds are on low grounds and marshes near-by, making it easily possible for infection to occur during its preparation.

As investigation has proven that winter-cured fish—which have been packed at a season when the growth of the organisms has been arrested by the low temperature—spoil when exposed to a warm temperature, it shows that some source of infection must be acting continuously. If the infection were due wholly to the salt, then the use of mined salt or sterile salt would suffice to prevent spoilage. Experiments made with the refined salts showed some improvement over the use of the solar salt. While the lower temperature of this coast in summer has aided very much in reducing the amount of reddened cod, part of the improvement is ascribed by some packers to the use of a higher grade of salt than used on the Atlantic coast. In the Provinces some mined salt is used, but spoilage occurs there also. As the spoilage is the same no matter in what form or where the fish may be shipped, the infection must take place during the preparation of the fish, and can not, therefore, come from external infection of the finished product.

Should local conditions be such that the infecting organisms abound naturally, they may be carried into the boats, the butt sheds, the flake yard, the storerooms, and preparation rooms by the wind, on the boots, clothing, or hands of sailors and factory employees, and by the use of water in making pickle and cleansing the buildings.

A Gloucester (Mass.) packer claims to have used acetic acid successfully in preventing fish from reddening and also in removing the objectionable color from specimens carrying it. His method is to apply with an ordinary nasal atomizer a small quantity of a 10 per cent solution of glacial acetic acid to the exterior of the fish. Experiments carried out by Bitting[a] indicated that the amount necessary for inhibition is about one-tenth of 1 per cent. Distilled vinegar has also a decided inhibiting action on the growth of the organisms, but

[a] United States Bureau of Chemistry Bulletin no. 133, p. 34.

as an objectionable odor results it is not possible to employ this medium.

According to Bitting,[a] "the further the bacteriological work on the cause of the reddening of salt fish is carried the stronger the evidence becomes that it is due to factory infection, to the use of contaminated water, and to the methods of handling. The outside influences, particularly the germs found in the lowlands and in the vicinity of the factory, have probably been greatly overestimated. The amount of infection due to the use of solar salt has not been definitely determined, as in the experiments intended for that purpose the amount due to factory infection was not wholly eliminated. What at the beginning appeared to be primarily a problem of how to avoid spoilage in an infected product by preventing the growth of the organisms present now appears to consist rather in the usual difficulty of preventing infection."

As a result of his investigations, Mr. Bitting makes the following recommendations for the prevention of factory infection:

1. The fish should be handled from the vessel to the scales without being thrown upon the deck or dock where they may become infected from the boards or be stepped upon by the workmen. All of the docks are infected with the red organisms, and fish coming in contact with them become inoculated.

2. The floors, scales, dressing tables, wash tanks, wheelbarrows, and everything with which the fish come in contact in making them ready for the butts should be frequently washed with water under considerable pressure. A relatively small stream of water under strong pressure is far more effectual in cleaning than a larger stream of water at low pressure.

3. The fish should be washed by sprays of water or by a machine. The sprays should have sufficient force to do the work well. The present method of pitching the fish into a tank or dory and then out again is not sufficient for cleaning, and, furthermore, it tends to disseminate any organisms which may be present.

4. The water used upon the fish or upon anything with which the fish come in contact should be of undoubted purity. The use of harbor water for any purpose can not be justified, as it is filled with the germs which come from emptying the butts and washing fish and docks. It is also apt to be polluted with sewage from the city, as was found to be the case in the investigation here reported.

5. The butts should be thoroughly cleaned inside and out and steamed for 20 minutes or sprayed with a solution of sulphurous acid.

6. Before fish are taken out of the butts water should be turned in to cause the brine to overflow and wash away any reddening which may have occurred on the top.

7. The fish should be passed through a spray of water to remove the adherent salt, as this adds weight and does not increase the time of keeping.

8. Racks used in water-horsing should be steamed or sprayed, and the work be done in the light and in one place in the factory rather than at any point in the shed where the butt may happen to be.

9. The drying should be carried as far as possible and still permit proper skinning. A second drying, or Nova Scotia style of cure, should be encouraged.

[a] United States Bureau of Chemistry Bulletin no. 133, p. 61.

FIG. 1.—COD GILL NETS ON DRYING REEL.

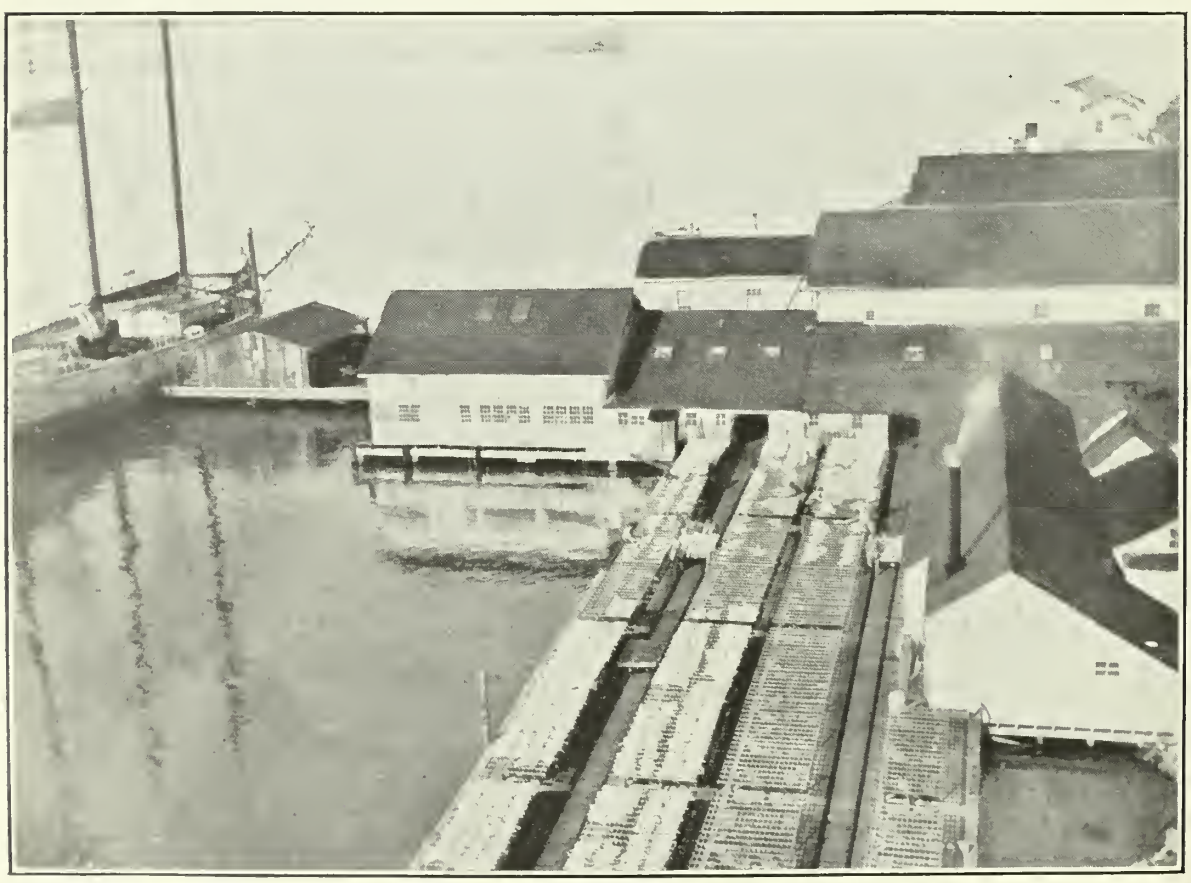

FIG. 2.—UNION FISH COMPANY'S HOME STATION AT UNION CITY, SAN FRANCISCO BAY, CAL.

10. The kenching in the storeroom should permit a circulation of air and not cause dead air spaces. The kench racks should be steamed or sprayed after each period of use.

11. The walls, posts, and floors should be sprayed often, once a week during the cool season and twice a week during the summer.

12. Treading the fish in drums should be prohibited. Workingmen coming in from the street in their dirty shoes obviously should not be allowed to tread the fish in the packing operation. A mechanical appliance would accomplish the same purpose in a cleanly manner.

13. The boxes used in carrying the fish from the storeroom to the skinning loft and from the tables to the cutters and packers should be washed each day.

14. The skinning or cutting tables should not have shelves or boxes beneath to catch bits of skin or fish. They should be well washed each evening. The simple brushing with a hand broom is not sufficient. The floor should be cleaned often.

15. All refuse should be removed from the room promptly. Bits of fish in barrels and boxes act only as incubators to perpetuate the infection.

16. The finished product should be held in a reasonably cool place in summer, and when shipped it should be handled under proper temperature conditions as are other meat products.

17. All new construction or remodeling should make ample provision for light. Many of the present structures are too dark.

18. All rubbish, as barrels, hoops, staves, waste, etc., should be removed from the flake yards and docks.

19. Concentrated sulphurous acid should be used as a disinfectant when steam is not available. One part of the acid to 50 parts of water is effectual where much reddening has occurred, and 1 part to 200 parts of water will be effective in preventing growth if used often.[a]

BROWN MOLD.

Brown mold, which forms brown, frecklelike spots on partly dried fish, occurs but rarely on this coast. It occurs usually on old fish, but may be found on comparatively fresh fish also. The fungus affects both sides of the fish, even covering the fins and tail. When it is found on comparatively fresh fish, they are scrubbed with a brush in running water, after which they are powdered. But little attention is paid to this fungus by the packers.

THE INDUSTRY IN 1915.

PERSONS EMPLOYED.

The following table shows the persons employed in the various branches of the industry and their nationality. California leads Washington in the total number of persons employed by a slight margin. The latter State leads, however, in the number of fishermen employed. The whites vastly outnumber the other employees, only 15 Indians and 16 Japanese being employed out of a total number of

[a] United States Bureau of Chemistry Bulletin no. 133, p. 61–63.

919. Most of the Japanese are employed as cooks, while the Indians act as fishermen exclusively.

PERSONS EMPLOYED IN THE COD FISHERIES OF THE PACIFIC COAST IN 1915.

How engaged.	Alaska.	Washington.	California.	Total.
In vessel fisheries: Whites	47	268	255	570
In transporting: Whites	17	.....	22	39
In shore and boat fisheries:				
Whites	143	.....	.....	143
Indians	16	.....	.....	16
Total	159	.....	.....	159
In shore work:				
Whites	22	59	95	176
Japanese	8	8	.....	16
Total	30	67	95	192
Total:				
Whites	229	327	372	887
Indians	16	.....	.....	16
Japanese	8	8	.....	16
Grand total	253	335	372	928

INVESTMENT.

Twenty-one vessels were engaged in fishing and 9 in transporting, while 11 launches, each under 5 net tons, and 533 boats were employed in all branches of the fisheries. Hand lines were used exclusively in the fishery. California leads in the total investment in the fishery, followed by Alaska and Washington in the order named. The high value of the investment in Alaska is due to the number of shore stations located there.

VESSELS, BOATS, APPARATUS, SHORE PROPERTY, AND CASH CAPITAL EMPLOYED IN THE COD FISHERIES OF THE PACIFIC COAST IN 1915.

Designation.	Alaska.		Washington.		California.		Total.	
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.
Vessels fishing	6	$47,500	8	$75,000	7	$95,000	21	$217,500
Tonnage	155	.....	2,084	.....	2,175	.....	4,414	.....
Outfit	.....	2,421	.....	32,881	.....	28,844	.....	64,146
Vessels transporting	5	11,900	.....	.....	4	70,500	9	82,400
Tonnage	59	.....	.....	.....	728	.....	787	.....
Outfit	.....	5,650	.....	.....	.....	17,000	.....	22,650
Launches under 5 tons	14	25,000	.....	.....	1	4,000	15	29,000
Boats	222	8,640	165	6,138	146	5,340	533	20,118
Apparatus:								
Vessel fisheries—Hand lines	.....	124	.....	797	.....	608	.....	1,529
Shore fisheries—Hand lines	.....	422	.....	.....	.....	.....	.....	422
Shore and accessory property	.....	114,600	.....	33,000	.....	96,000	.....	243,600
Cash capital	.....	55,510	.....	53,820	.....	42,585	.....	151,915
Total	.....	271,767	.....	201,636	.....	359,877	.....	833,280

PRODUCTS.

The total number of cod landed in 1915 amounted to 3,801,586, the second largest number ever landed in one year on the Pacific coast, with a round weight of 38,015,860 pounds. The cured weight of these fish amounted to 15,199,314 pounds, which had a value of $501,568 as delivered at the home ports. As the companies prepare and market their own fish in a dried, boneless, pickled, etc., condition, the ultimate returns received by the companies will be much larger than is shown in this table.

The vessel fisheries produced 10,934,284 pounds of cured products, valued at $360,322, while the shore fisheries produced 4,265,030 pounds, valued at $141,246.

Washington leads in the total quantity produced and the value of same, followed by California and Alaska in the order named. Nearly all of the shore stations operated in Alaska are owned by Californians.

PRODUCTS OF THE COD FISHERIES OF THE PACIFIC COAST IN 1915.

Fisheries.	Cod, dry-salted.				Cod tongues.		Cod oil.	
	Number.	Round weight.	Prepared weight.	Value.	Weight.	Value.	Weight.	Value.
VESSEL.		*Pounds.*	*Pounds.*		*Pounds.*		*Pounds.*	
Alaska	105,500	1,055,000	422,000	$13,926	.....	.....	.....	.....
Washington	1,374,571	13,745,710	5,498,284	180,934	30,000	$2,090	.....	.....
California	1,253,500	12,535,000	5,014,000	165,462	7,400	370	.....	.....
Total	2,733,571	27,335,710	10,934,284	360,322	37,400	2,460	.....	.....
SHORE.								
Alaska	[a] 1,068,015	10,680,150	4,265,030	141,246	18,000	900	825	$33
Total:								
Alaska	1,170,000	11,700,000	4,680,000	154,440	18,000	900	825	33
Washington	1,374,571	13,745,710	5,498,284	180,934	30,000	2,090	.....	.....
California	1,253,500	12,535,000	5,014,000	165,462	7,400	370	.....	.....
Grand total	3,801,586	38,015,860	15,199,314	501,568	55,400	3,360	[b] 825	33

[a] Includes 3,515 stockfish, with a round weight of 35,150 pounds and a prepared weight of 7,030 pounds, valued at $732.
[b] Represents 110 gallons.

THE FISHING FLEET IN 1915.

The following table shows a list of the vessels engaged in the cod-fishery during 1915, together with the names and home ports of the owners, the net tonnage of the vessels, and the number of fishermen, members of the dress gang, and others employed aboard the vessels, also the number of dories used in fishing:

THE PACIFIC COAST CODFISHING FLEET IN 1915.

Name.	Rig.	Owner.	Home port.	Net tonnage.	Crew.			Dories.
					Fishermen.	Dress gang.	Others.	
ALASKA.								
Nonpareil	Gas. s.	Alaska Codfish Co.	Unga	31	6		2	6
Pirate	Gas. s.	Union Fish Co	Pirate Cove	30	6		2	6
Lettie	Gas. s.	And. Grosvold	Sand Point	28	6		2	6
Highland Queen	Gas. s.	Knute Knutson	N. W. Harbor	12	6		1	2
Challenge	Gas. s.	Roe & Pollett	Nome	35	6		2	6
Silver Wave	Gas. s.	do	do	19	6		2	6
Total				155	36		11	32
WASHINGTON.								
Azalea	Sch.	Matheson Fisheries Co.	Anacortes	327	23	12	3	23
Fanny Dutard	Sch.	do	do	252	22	11	3	22
Alice	Sch.	Robinson Fisheries Co.	do	220	21	12	3	21
Wawona	Sch.	do	do	413	25	14	3	25
Fortuna	Sch.	Northern Codfish Co.	Seattle	138	10	7	2	10
John A	Sch.	Pacific Coast Codfish Co.	do	235	20	12	3	20
Maid of Orleans	Sch.	do	do	171	12	8	3	12
Chas. R. Wilson	Sch.	do	do	328	23	13	3	23
Total				2,084	156	89	23	156
CALIFORNIA.								
Galilee	Sch.	Union Fish Co	San Francisco	328	24	14	3	24
Sequoia	Sch.	do	do	324	24	14	3	24
Vega	Sch.	do	do	233	14	10	3	14
Glendale	Sch.	Alaska Codfish Co.	do	281	21	12	3	21
City of Papeete	Sch.	do	do	370	24	14	3	24
Maweema		do	do	392	24	14	3	24
Ottillie Fjord	Sch.	Pacific States Trading Co.	do	247	15	10	3	15
Total				2,175	146	88	21	146
Grand total				4,414	338	177	55	334

THE TRANSPORTING FLEET IN 1915.

The following list shows the vessels employed in the transporting of fish from the various shore stations in Alaska and the carrying of supplies to or between those stations, together with the owners and home ports of same, also the net tonnage of these vessels and the number of persons employed on them.

TRANSPORTING VESSELS EMPLOYED IN THE CODFISHERIES OF THE PACIFIC COAST IN 1915.

Name.	Rig.	Owner.	Home port.	Net tonnage.	Crew.
ALASKA.					
Union Flag	Gas. s.	Union Fish Co	Pirate Cove	7	2
Pirate [a]	Gas. s.	do	do	30	3
Lena	Gas. s.	And. Grosvold	Sand Point	12	3
Nonpareil [a] [b]	Gas. s.	Alaska Codfish Co	Unga	31	3
Martha	Sch.	Union Fish Co	Pirate Cove	14	2
Volcano	Sch.	do	Pavlof	17	2
Pitti Sing	Sch.	A. Komedal	Unga	9	2
Total				120	17
CALIFORNIA.					
Golden State	Gas. s.	Union Fish Co	San Francisco	223	8
Allen A	Sch.	Alaska Codfish Co	do	266	6
Bertha Dolbeer	Sch.	Pacific States Trading Co	do	230	6
Union	Gas. s.	Union Fish Co	do	9	2
Total				728	22
Grand total				1,594	55

[a] Fished part of the year. [b] Wrecked early in year.

ALASKA SHORE STATIONS OPERATED IN 1915.

The shore stations here noted were all operated during the year 1915. In addition there were in reserve the Eagle Harbor station of the Union Fish Co. and the Squaw Harbor station of Mr. John H. Nelson.

SHORE CODFISHING STATIONS OPERATED IN ALASKA IN 1915.

Name.	Island on which located.	Owner.	Headquarters.
Unga	Unga	Alaska Codfish Co	San Francisco.
Squaw Harbor	do	do	Do.
Kellys Rock	do	do	Do.
Company Harbor	Sannak	do	Do.
Moffets Cove	do	do	Do.
Dora Harbor	Unimak	do	Do.
Squaw Harbor	Unga	John H. Nelson	Unga, Alaska.
Hard Scratch	do	R. H. Johnson	Sand Point, Alaska.
Northwest Harbor	Herendeen	Pacific States Trading Co	San Francisco.
Pirate Cove	Popof	Union Fish Co	Do.
Northwest Harbor	Herendeen	do	Do.
Sanborn Harbor	Nagai	do	Do.
Unga	Unga	do	Do.
Pavlof Harbor	Sannak	do	Do.
Johnson Harbor	do	do	Do.
Dora Harbor	Unimak	do	Do.
Unga	Unga	A. Komedal	Unga, Alaska.

SUMMARY OF CATCH.

The following table gives a complete summary of all the codfish secured in the vessel and shore fisheries from the inception of the industry and carried to the home ports in Washington and California. No effort has been made to include the cod consumed locally in Alaska, which, in the aggregate, amounts to considerable, as it forms the principal article of diet along a considerable stretch of Alaska's coast line. This table shows that 54,052,993 fish were secured in the vessel fishery and 25,368,468 in the shore fishery, or a grand total of 79,421,461 fish.

SUMMARY OF COD CATCH.

Year.	Vessel fishery.	Shore fishery.	Total.	Year.	Vessel fishery.	Shore fishery.	Total.
	Number.	*Number.*	*Number.*		*Number.*	*Number.*	*Number.*
1863	7,100	.....	7,100	1891	583,000	662,000	1,245,000
1864	51,500	.....	54,500	1892	775,000	700,000	1,475,000
1865	225,000	.....	225,000	1893	666,000	660,000	1,326,000
1866	724,000	.....	724,000	1894	698,000	305,000	1,003,000
1867	943,400	.....	943,400	1895	765,000	286,000	1,051,000
1868	580,000	.....	580,000	1896	837,000	.....	837,000
1869	1,032,000	.....	1,032,000	1897	850,000	511,000	1,361,000
1870	1,467,000	.....	1,467,000	1898	342,000	450,000	792,000
1871	926,000	.....	926,000	1899	783,000	722,000	1,505,000
1872	305,000	.....	305,000	1900	817,000	909,000	1,726,000
1873	563,000	.....	563,000	1901	787,000	727,000	1,514,000
1874	369,000	.....	369,000	1902	1,229,000	1,140,000	2,369,000
1875	362,000	.....	362,000	1903	1,463,800	985,000	2,448,800
1876	814,000	30,000	844,000	1904	1,546,524	1,002,000	2,548,524
1877	779,000	101,000	880,000	1905	2,332,133	1,282,000	3,614,133
1878	902,000	227,000	1,127,000	1906	2,492,618	1,020,632	3,513,250
1879	1,301,000	198,000	1,499,000	1907	1,490,230	1,518,951	3,009,181
1880	1,002,000	201,000	1,203,000	1908	2,028,000	1,146,403	3,174,403
1881	907,000	154,000	1,061,000	1909	1,748,155	910,361	2,658,516
1882	1,038,000	203,000	1,241,000	1910	1,291,500	683,475	1,974,975
1883	1,485,000	235,000	1,720,000	1911	1,542,000	992,000	2,534,000
1884	1,373,000	249,000	1,622,000	1912	1,348,000	997,934	2,345,934
1885	988,000	386,000	1,374,000	1913	1,481,260	804,097	2,285,357
1886	800,000	383,000	1,183,000	1914	2,283,202	1,585,600	3,868,802
1887	827,000	299,000	1,126,000	1915	2,733,571	1,068,015	3,801,586
1888	674,000	372,000	1,046,000				
1889	327,000	489,000	816,000	Total	54,052,993	25,368,468	79,421,461
1890	365,000	773,000	1,138,000				

SUMMARY OF VESSEL-FISHING DATA.

The following table shows, in a summarized form, the available data covering the vessel fishery for cod on the Pacific coast from its inception in 1863 to 1915, inclusive. In this table is shown, by years, the number of vessels from the different States fishing on the various grounds, and the catch made on each ground. As separate data of the catches of the small vessels operating with the Alaska shore stations as their base have not been kept, it has not been possible to include these in this table, and they are merged into the shore-station data. The total catch of the fleet since 1863 amounts to 54,052,993 cod.

Summary of Vessel Fishing, 1863 to 1915.

CALIFORNIA VESSELS.

Years.	Number of vessels engaged.				Total net tonnage.	Number of fish caught.			
	Okhotsk Sea.	Bering Sea.	North Pacific.	Total.		Okhotsk Sea.	Bering Sea.	North Pacific.	Total.
1863	1	.....	.....	1	120	7,100	.....	.....	7,100
1864	1	1	.....	2	.....	50,000	4,500	.....	54,500
1865	6	.....	1	7	449	210,000	.....	15,000	225,000
1866	.....	.....	3	18	.....	588,000	.....	136,000	724,000
1867	.....	.....	.....	20	.....	.....	.....	.....	943,400
1868	7	.....	3	10	1,502	377,000	.....	203,000	580,000
1869	.....	.....	.....	21	.....	.....	.....	.....	1,032,000
1870	12	.....	10	22	.....	1,027,000	.....	440,000	1,467,000
1871	5	.....	8	13	.....	53[illegible],000	.....	394,000	9 6,000
1872	2	.....	4	6	.....	130,000	.....	175,500	305,500
1873	5	.....	5	10	.....	352,000	.....	211,000	563,000
1874	.....	.....	7	7	.....	.....	.....	369,000	369,000
1875	.....	.....	5	5	506	.....	.....	362,000	362,000
1876	3	.....	8	11	.....	333,000	.....	481,000	814,000
1877	5	.....	6	11	.....	426,000	.....	353,000	779,000
1878	4	.....	6	10	.....	651,000	.....	251,000	902,000
1879	5	.....	7	12	1,858	843,000	.....	458,000	1,301,000
1880	6	.....	1	7	1,441	915,000	.....	87,000	1,002,000
1881	5	.....	2	7	1,441	764,000	.....	143,000	907,000
1882	5	2	6	13	2,260	712,000	132,000	194,000	1,038,000
1883	7	5	2	14	2,837	983,000	381,000	121,000	1,485,000
1884	11	3	.....	14	3,222	1,007,000	366,000	.....	1,373,000
1885	4	3	3	10	2,287	493,000	296,000	199,000	988,000
1886	4	2	2	8	1,939	428,000	239,000	133,000	800,000
1887	2	1	4	7	1,558	331,000	185,000	311,000	827,000
1888	2	2	2	6	1,391	311,000	294,000	69,000	674,000
1889	2	.....	.....	2	623	327,000	.....	.....	327,000
1890	2	1	.....	3	715	317,000	48,000	.....	365,000
1891	1	5	.....	6	1,232	171,000	387,000	.....	558,000
1892	1	4	.....	5	1,335	125,000	487,000	.....	612,000
1893	2	3	1	6	1,460	341,000	215,000	.....	556,000
1894	1	4	.....	5	1,393	169,000	420,000	.....	589,000
1895	2	4	.....	6	1,518	248,000	405,000	.....	653,000
1896	1	5	.....	6	1,512	125,000	493,000	.....	618,000
1897	.....	5	.....	5	1,393	.....	554,000	.....	554,000
1898	.....	3	.....	3	780	.....	292,000	.....	292,000
1899	.....	5	.....	5	1,174	.....	580,000	.....	580,000
1900	.....	6	.....	6	1,305	.....	623,000	.....	623,000
1901	.....	6	.....	6	1,540	.....	702,000	.....	702,000
1902	.....	9	.....	9	2,034	.....	933,000	.....	933,000
1903	1	7	.....	8	1,899	170,000	867,300	.....	1,037,300
1904	1	5	1	7	1,939	223,000	770,000	69,200	1,062,200
1905	4	7	.....	11	2,928	636,000	700,133	.....	1,336,133
1906	5	6	.....	11	3,237	692,000	786,000	.....	1,478,000
1907	4	4	.....	8	2,400	271,800	470,000	.....	741,800
1908	3	4	.....	7	2,259	420,000	490,000	.....	910,000
1909	1	4	.....	5	1,416	80,000	520,000	.....	600,000
1910	.....	3	.....	3	1,074	.....	380,000	.....	380,000
1911	.....	3	.....	3	993	.....	439,000	.....	439,000
1912	.....	4	1	5	1,554	.....	525,000	139,000	664,000
1913	.....	4	1	5	1,554	.....	587,000	130,000	717,000
1914	.....	5	1	6	1,783	.....	781,202	150,000	931,202
1915	.....	6	1	7	2,175	.....	1,134,500	119,000	1,253,500
Total	.....	.....	.....	.....	.....	15,785,900	16,486,635	5,712,700	39,960,635

Summary of Vessel Fishing, 1863 to 1915—Continued.

WASHINGTON VESSELS.

Years.	Number of vessels engaged.				Total net tonnage.	Number of fish caught.			
	Okhotsk Sea.	Bering Sea.	North Pacific.	Total.		Okhotsk Sea.	Bering Sea.	North Pacific.	Total.
1891	.....	1	.....	1	142	.....	25,000	.....	25,000
1892	.....	2	.....	2	210	.....	163,000	.....	163,000
1893	.....	1	.....	1	142	.....	110,000	.....	110,000
1894	.....	1	.....	1	142	.....	109,000	.....	109,000
1895	.....	1	.....	1	142	.....	112,000	.....	112,000
1896	.....	2	.....	2	508	.....	219,000	.....	219,000
1897	.....	3	.....	3	361	.....	296,000	.....	296,000
1898	.....	1	.....	1	89	.....	50,000	.....	50,000
1899	.....	2	.....	2	286	.....	203,000	.....	203,000
1900	.....	2	.....	2	286	.....	194,000	.....	194,000
1901	.....	1	.....	1	142	.....	85,000	.....	85,000
1902	.....	3	.....	3	368	.....	[a] 296,000	.....	296,000
1903	.....	3	1	4	490	.....	[b] 331,500	95,000	426,500
1904	.....	6	.....	6	599	.....	[c] 484,324	.....	484,324
1905	.....	9	.....	10	1,610	.....	[d] 996,000	.....	996,000
1906	.....	5	3	8	1,425	.....	734,618	280,000	1,014,618
1907	.....	5	.....	5	974	.....	748,430	.....	748,430
1908	.....	7	1	8	1,622	.....	1,008,000	110,000	1,118,000
1909	.....	8	.....	8	1,622	.....	1,148,155	.....	1,148,155
1910	.....	6	.....	6	1,249	.....	911,500	.....	911,500
1911	.....	7	.....	7	1,484	.....	1,103,000	.....	1,103,000
1912	.....	5	1	6	1,251	.....	[e] 550,000	134,000	684,000
1913	.....	5	1	6	1,604	.....	624,260	140,000	764,260
1914	.....	8	1	9	2,482	.....	[f] 1,143,000	209,000	1,352,000
1915	.....	7	1	8	2,084	.....	1,220,571	154,000	1,374,571
Total	.....	.....	.....	.....	.....	.....	12,865,358	1,122,000	13,987,358

[a] Includes catch by British Columbia schooner Blakeley (144 tons), 107,000 fish.
[b] Includes catch by British Columbia schooner Blakeley (144 tons), 115,000 fish.
[c] Includes catch by British Columbia schooner Blakeley (144 tons), 100,000 fish.
[d] Includes catch by British Columbia schooner Blakeley (144 tons), 78,000 fish.
[e] Includes catch by schooner Albert Meyer (398 tons), British Columbia, 260 fish.
[f] Includes catch by schooner Albert Meyer (398 tons), British Columbia, 100,000 fish.

NOTE.—In addition 6 Alaska vessels, with total net tonnage of 167, caught in the North Pacific 105,500 fish. These data have been included in the "Recapitulation."

RECAPITULATION.

Years.	Vessels.		Total number of fish caught.	Years.	Vessels.		Total number of fish caught.
	Total number.	Total net tonnage.			Total number.	Total net tonnage.	
1863	1	120	7,100	1891	7	1,374	583,000
1864	2	.....	54,500	1892	7	1,545	775,000
1865	7	449	225,000	1893	7	1,602	666,000
1866	18	.....	724,000	1894	6	1,535	698,000
1867	20	.....	943,400	1895	7	1,660	765,000
1868	10	1,502	580,000	1896	8	2,020	837,000
1869	21	.....	1,032,000	1897	7	1,754	850,000
1870	22	.....	1,467,000	1898	2	869	342,000
1871	13	.....	926,000	1899	7	1,460	783,000
1872	6	.....	305,500	1900	7	1,591	817,000
1873	10	.....	563,000	1901	7	1,682	787,000
1874	7	.....	369,000	1902	12	2,402	1,229,000
1875	5	506	362,000	1903	12	2,389	1,463,800
1876	11	.....	814,000	1904	13	2,538	1,546,52
1877	11	.....	779,000	1905	21	4,538	2,332,13
1878	10	.....	902,000	1906	19	4,662	2,492,61
1879	12	1,858	1,301,000	1907	13	3,374	1,490,23
1880	7	1,441	1,002,000	1908	15	3,881	2,028,00
1881	7	1,441	907,000	1909	13	3,038	1,748,15
1882	13	2,260	1,038,000	1910	9	2,323	1,291,50
1883	14	2,837	1,485,000	1911	10	2,477	1,542,00
1884	14	3,222	1,373,000	1912	10	2,805	1,348,00
1885	10	2,287	988,000	1913	11	3,158	1,481,26
1886	8	1,939	800,000	1914	15	4,265	2,283,20
1887	7	1,558	827,000	1915	21	4,426	2,628,07
1888	6	1,391	674,000				
1889	2	623	327,000	Total	.....	.....	53,947,99
1890	3	715	365,000				

DETAILED DATA OF THE FISHING FLEET FROM 1863 TO 1915.

The table following shows in detail the operations of the cod-fishing fleet from the inception of the industry in 1863 to 1915, inclusive. The name, rig, and net tonnage of each vessel, the dates of her departure and return, on what ground she fished, and the number of fish taken are all shown.[a] No detailed data are available for 1866 and 1869, while the individual vessel data for 1867 and 1868 are incomplete. From 1863 to 1890, both inclusive, the data relate to California exclusively. Owing to the variation in the weight of fish from the various grounds, and also the considerable variation in weight of fish from the same ground in different years, no effort has been made to show the weight of the catch, while the data on the prices realized are so fragmentary that this item also has been omitted, as it would be nothing but a guess at best.

OPERATIONS OF THE COD FLEET BY YEARS.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Fishing grounds.	Number of fish taken.
1863.						
CALIFORNIA.[b]						
Timandra [c]	Brig.	120			Okhotsk Sea	7,100
1864.						
Timandra	Brig.	120			Okhotsk Sea	50,000
Alert	Sch.				Bering Sea	4,500
Total						54,500
1865.						
Equity	Sch.	63			Okhotsk Sea	210,000
Flying Dart	Sch.	84			do	
H. L. Ruggles	Sch.	75			do	
J. D. Sanborn	Sch.	71			do	
Mary Cleveland	Sch.	91			do	
Taccon	Sch.	20			do	
Porpoise	Sch.	45	Mar. 27	July 7	Shumagin Islands [d]	15,000
Total		449				225,000
1867.						
Sanborn	Sch.				Shumagin Islands	64,000
Porpoise	Sch.				do	36,000
Sarah Louise	Sch.				do	36,000
Total						136,000
1868.						
Porpoise [e]	Sch.				Shumagin Islands	63,000
Mandrago	Sch.				do	85,000
Sanborn	Sch.				do	60,000
Total						208,000

[a] For the data covering the San Francisco fleet from 1870 to 1914, inclusive, the writer is indebted to the Union Fish Co. (formerly the McCollam Fishing & Trading Co.), of San Francisco, which placed its invaluable records at his disposal.

[b] From 1863 to 1890, inclusive, data relate to California exclusively.

[c] Trading voyage.

[d] First fare from the Shumagins.

[e] Made two trips.

OPERATIONS OF THE COD FLEET BY YEARS—Continued.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Fishing grounds.	Number of fish taken.
1870.						
Clara R. Sutill					Okhotsk Sea	92,000
Constitution	Bkn.	257			do	18,000
Carib					do	92,000
Domingo	Bark.				do	95,000
Florence					do	85,000
Gold Hunter	Bark.				do	125,000
Legal Tender	Bark.				do	125,000
Union					do	100,000
Francisco					do	91,000
Witch Queen					do	62,000
Alaska	Bark.				do	102,000
Shooting Star	Bark.				do	40,000
Arizona					Shumagin Islands	55,000
Ann Eliza					do	20,000
Daisy					do	20,000
J. H. Roscoe	Sch.	79			do	65,000
Mary Zephyr					do	35,000
Porpoise	Sch.				do	38,000
Romp					do	32,000
Sarah Louise	Sch.				do	35,000
Scotland					do	55,000
Wild Gazelle	Sch.	114			do	85,000
Total						1,467,000
1871.						
Union					Okhotsk Sea	126,000
Legal Tender	Bark.				do	135,000
Gold Hunter	Bark.				do	125,000
Clara R. Sutill					do	66,000
Domingo	Bark.				do	80,000
Daisy					Shumagin Islands	15,000
Shooting Star					do	35,000
Alaska	Bark.				do	92,000
S. H. Merrill					do	85,000
Flying Mist					do	35,000
Scotland					do	46,000
Alfred Adams	Sch.	64			do	42,000
J. H. Roscoe	Sch.	79			do	44,000
Total						926,000
1872.						
Gold Hunter	Bark.				Okhotsk Sea	130,000
Scotland					do	
Legal Tender	Bark.				Shumagin Islands	25,000
J. H. Roscoe	Sch.	79			do	58,500
Wild Gazelle	Sch.	114			do	61,000
Flying Mist					do	31,000
Total						305,000
1873.						
Gold Hunter	Bark.		Apr. 13		Okhotsk Sea	125,000
Clara R. Sutill			Apr. 26		do	87,000
Page	Sch.	125	Apr. 19			76,000
Energy	Bark.		Apr. 10			64,000
Domingo	Bark.		May 15			
Wild Gazelle	Sch.	108	Apr. 19		Shumagin Islands	89,000
Alfred Adams	Sch.	64	Mar. 10		do	40,000
Flying Mist			Mar. 7		do	28,000
Alfred Adams	Sch.	64	July 5		do	30,000
Flying Mist			July 15		do	24,000
Total						563,000
1874.						
San Diego	Sch.	36	Apr. 12	July 22	Shumagin Islands	28,000
Energy	Bark.		Apr. 13	Aug. 23	do	80,000
Joseph Wooley	Sch.		Apr. 12	Sept. 5	do	90,000
Alfred Adams	Sch.	64	Apr. 15	Aug. 15	do	56,000
Wild Gazelle	Sch.	114	Apr. 23	Aug. 20	do	78,000
San Diego	Sch.			Oct. 18	do	22,000
Page	Sch.	125		Oct. 11		15,000
Total						369,000

OPERATIONS OF THE COD FLEET BY YEARS—Continued.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Fishing grounds.	Number of fish taken.
1875.						
Undaunted	Sch.	68	Mar. 15	.....	Shumagin Islands	46,000
Alfred Adams	Sch.	64	Mar. 29	Aug. 20	do	56,000
Wild Gazelle	Sch.	108	Apr. 16	Sept. 3	do	93,000
Dashing Wave	Sch.	141	Apr. 18	.....	do	95,000
Page	Sch.	125	.....	.....	.....	72,000
Total	.....	506	.....	.....	.....	362,000
1876.						
Alfred Adams	Sch.	64	Jan. 9	July 3	Shumagin Islands	62,000
Alaska	Sch.	32	Mar. 9	July 6	do	28,000
Do	.....	.....	July 19	.....	do	70,000
Selma	.....	.....	Mar. 9	July 1	do	70,000
Page	Sch.	125	Apr. 1	Aug. 19	do	73,000
Energy	Bark.	.....	Aug. 15	do	do	65,000
San Diego	Sch.	36	.....	Aug. 10	do	19,000
Wild Gazelle	Sch.	114	Apr. 12	Sept. 20	do	94,000
Hesperian	.....	.....	Apr. 7	Oct. 11	Okhotsk Sea	150,000
Josephine	Brig.	207	Apr. 12	do	do	130,000
Constitution	Bkn.	257	June 20	.....	do	53,000
Total	.....	.....	.....	.....	.....	814,000
1877.						
Page	Sch.	125	Apr. 17	Aug. 17	Okhotsk Sea	62,000
Constitution	Bkn.	257	Apr. 21	Sept. 14	do	133,000
Fremont	Bkn.	345	Apr. 22	do	do	208,000
Brontes	.....	.....	Apr. 25	Lost	.....	.....
Alaska	Sch.	32	Mar. 25	Sept. 11	Shumagin Islands	16,000
J. H. Roscoe	Sch.	79	Apr. 28	Aug. 4	do	61,000
Energy	Bark.	.....	do	Aug. 30	do	70,000
Alfred Adams	Sch.	64	Apr. 4	June 17	do	67,000
Do	.....	.....	June 29	Aug. 25	do	44,000
Wild Gazelle	Sch.	114	Apr. 6	Sept. 4	do	95,000
Pato [a]	Sch.	45	Mar. —	.....	Okhotsk Sea	23,000
Total	.....	.....	.....	.....	.....	779,000
1878.						
General Miller	Sch.	108	May 18	Sept. 25	Shumagin Islands	23,000
J. H. Roscoe	Sch.	79	Apr. 9	Aug. 30	do	20,000
May Queen	Sch.	.....	Apr. 3	Aug. 7	do	75,000
Sarah	Sch.	105	Mar. 29	Aug. 24	do	78,000
Three Sisters [b]	Sch.	62	.....	.....	do	35,000
Wild Gazelle	Sch.	114	Apr. 6	Aug. 30	do	20,000
Adelaide Cooper	Bark.	300	Apr. 16	Oct. 2	Okhotsk Sea	216,000
Constitution	Bkn.	257	Apr. 11	Sept. 12	do	140,000
Fremont	Bkn.	345	Apr. 20	Sept. 29	do	250,000
Page	Sch.	125	Apr. 9	Sept. 10	do	45,000
Total	.....	.....	.....	.....	.....	902,000
1879.						
Wild Gazelle	Sch.	114	Apr. 2	Sept. 20	Shumagin Islands	85,000
Sarah	Sch.	105	Mar. 16	Aug. 4	do	71,000
Undaunted	Sch.	68	Mar. 15	June 21	do	63,000
H. L. Tiernan	Sch.	145	May 3	Sept. 10	do	97,000
General Miller	Sch.	108	Apr. 3	Sept. 21	do	80,000
Alaska	Sch.	32	Mar. 11	Sept. 10	do	10,000
J. H. Roscoe	Sch.	79	Feb. 28	Aug. 1	do	52,000
Adelaide Cooper	Bark.	300	.....	Sept. 28	Okhotsk Sea	225,000
Fremont	Bkn.	345	.....	Oct. 1	do	240,000
Constitution	Bkn.	257	.....	Sept. 21	do	205,000
Page	Sch.	125	May 13	Oct. 8	do	40,000
Glencoe	Brig.	169	.....	Nov. 7	do	133,000
Total	.....	1,847	.....	.....	.....	1,301,000

[a] Sailed from Hongkong, China, and landed cargo at Portland, Oreg.; the only cargo of cod ever landed here.

[b] Lost.

OPERATIONS OF THE COD FLEET BY YEARS—Continued.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Fishing grounds.	Number of fish taken.
1880.						
Wild Gazelle	Sch.	114	Apr. 8	Aug. 23	Shumagin Islands	87,000
Arago	Sch.	176	May 2	Sept. 20	Okhotsk Sea	125,000
Page	Sch.	109	May 8	Sept. 4	do	60,000
Glencoe	Brig.	169	May 1	Oct. 28	do	120,000
Fremont	Bkn.	328	May 6	Oct. 10	do	220,000
Constitution	Bkn.	276	May 8	Oct. 28	do	165,000
San Luis	Bkn.	275	May 17	Oct. 4	do	225,000
Total		1,441				1,002,000
1881.						
Wild Gazelle	Sch.	114	Apr. 1	Aug. 28	Shumagin Islands	75,000
Page	Sch.	109	Apr. 23	Sept. 12	do	68,000
Arago	Sch.	176	Apr. 27	Sept. 11	Okhotsk Sea	90,000
Constitution	Bkn.	276	do	Oct. 17	do	185,000
Glencoe	Brig.	169	Apr. 29	Oct. 15	do	103,000
Fremont	Bkn.	328	Apr. 30	Sept. 18	do	201,000
San Luis	Bkn.	275	May 6	Oct. 15	do	185,000
Total		1,441				907,000
1882.						
Ariel	Sch.	94	Mar. 18	Aug. 18	Shumagin Islands	49,000
Page	Sch.	109	Mar. 20	Aug. 24	do	31,000
General Miller	Sch.	108	do	Lost	do	
H. L. Tiernan	Sch.	142	Apr. 5	Ashore	do	
Dashing Wave	Sch.	141	Apr. 29	Sept. 19	do	60,000
Adrianna	Sch.	95	May 8	July 6	do	54,000
Isabel	Sch.	175	May 12	Sept. 1	Bering Sea	50,000
Tropic Bird	Brig.	172	Apr. 28	Sept. 25	do	82,000
Arago	Sch.	176	Apr. 15	Sept. 28	Okhotsk Sea	111,000
San Luis	Bkn.	275	Apr. 29	Oct. 9	do	185,000
Glencoe	Brig.	169	May 4	Oct. 17	do	72,000
Fremont	Bkn.	328	May 6	Sept. 28	do	204,000
Constitution	Bkn.	276	May 13	Oct. 13	do	140,000
Total		2,260				1,038,000
1883.						
W. H. Stevens	Sch.	139	Apr. 21	July 27	Shumagin Islands	77,000
Dashing Wave	Sch.	141	May 7	Sept. 21	do	44,000
John Hancock	Sch.	167	Mar. 29	Aug. 22	Bering Sea	75,000
Francis Alice	Sch.	125	do	do	do	60,000
Bonanza	Sch.	128	Apr. 14	do	do	52,000
Tropic Bird	Brig.	172	Mar. 29	do	do	89,000
Isabel	Sch.	175	Apr. 2	Sept. 19	do	105,000
Arago	Sch.	176	Apr. 16	Oct. 5	Okhotsk Sea	96,000
Hera	Sch.	369	Apr. 20	Oct. 19	do	188,000
San Luis	Bkn.	275	Apr. 24	Oct. 15	do	150,000
Constitution	Bkn.	276	do	Oct. 6	do	150,000
Glencoe	Brig.	169	Apr. 25	Oct. 27	do	95,000
Fremont	Bkn.	328	Apr. 28	Sept. 19	do	186,000
Una	Sch.	197	Apr. 30	Oct. 3	do	118,000
Total		2,837				1,485,000
1884.						
Dashing Wave	Sch.	141	Mar. 22	Aug. 25	Bering Sea	85,000
John Hancock	Sch.	167	Mar. 23	July 27	do	96,000
Helen W. Almy	Bark.	298	Apr. 2	Sept. 5	do	185,000
Hera	Sch.	369	Apr. 9	Oct. 3	Okhotsk Sea	135,000
Arago	Sch.	176	Apr. 11	Oct. 7	do	80,000
Isabel	Sch.	175	Apr. 13	Oct. 4	do	90,000
W. H. Meyer	Brig.	256	Apr. 18	Oct. 9	do	90,000
Tropic Bird	Brig.	172	Apr. 20	Oct. 6	do	82,000
Jane A. Falkenburg	Bkn.	295	do	Oct. 3	do	136,000
San Luis	Bkn.	275	Apr. 26	do	do	90,000
Constitution	Bkn.	276	do	Oct. 6	do	104,000
Fremont	Bkn.	328	May 2	Oct. 1	do	118,000
Glencoe	Brig.	169	May 5	Oct. 27	do	42,000
Francis Alice	Sch.	125		Oct. 25	do	40,000
Total		3,222				1,373,000

OPERATIONS OF THE COD FLEET BY YEARS—Continued.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Fishing grounds.	Number of fish taken.
1885.						
Arago	Sch.	176	Mar. 27	Sept. 11	Shumagin Islands	50,000
John Hancock	Sch.	167	Apr. 1	Aug. 2	do	64,000
Isabel	Sch.	175	Apr. 18	Aug. 27	do	85,000
Helen W. Almy	Bark.	298	do	Sept. 5	Bering Sea	182,000
Constitution	Bkn.	276	Apr. 22	Oct. 9	Okhotsk Sea	120,000
Tropic Bird	Brig.	172	Apr. 25	Sept. 18	Bering Sea	79,000
Francis Alice	Sch.	125	Apr. 28	Aug. 10	do	35,000
San Luis	Bkn.	273	Apr. 30	Oct. 16	Okhotsk Sea	118,000
Fremont	Bkn.	328	May 2	Oct. 8	do	135,000
Jane A. Falkenburg	Bkn.	295	May 3	Sept. 25	do	120,000
Total		2,287				988,000
1886.						
Isabel	Sch.	175	Apr. 1	Aug. 11	Shumagin Islands	92,000
Francis Alice	Sch.	125	Apr. 3	July 15	Bering Sea	69,000
John Hancock	Sch.	167	Apr. 13	Aug. 6	Shumagin Islands	41,000
Helen W. Almy	Bark.	298	do	Sept. 15	Bering Sea	170,000
Fremont	Bkn.	328	Apr. 23	Oct. 4	Okhotsk Sea	141,000
Constitution	Bkn.	276	May 4	Oct. 1	do	84,000
San Luis	Bkn.	275	May 9	Oct. 7	do	102,000
Jane A. Falkenburg	Bkn.	295	May 21	Oct. 5	do	101,000
Total		1,939				800,000
1887.						
John Hancock	Sch.	167	Mar. 20	July 12	Shumagin Islands	76,000
Isabel	Sch.	175	Mar. 26	Aug. 25	do	80,000
Dashing Wave	Sch.	141	Apr. 6	Aug. 29	do	79,000
Arago	Sch.	176	Apr. 24	Sept. 4	do	76,000
Constitution	Bkn.	276	Apr. 12	Aug. 12	Bering Sea	185,000
Fremont	Bkn.	328	May 4	Sept. 19	Okhotsk Sea	180,000
Jane A. Falkenburg	Bkn.	295	May 29	Oct. 5	do	151,000
Total		1,558				827,000
1888.						
Dashing Wave	Sch.	141	Mar. 16	July 21	Shumagin Islands	69,000
Arago	Sch.	176	Apr. 12	Sept. 2	Bering Sea	103,000
Constitution	Bkn.	276	Apr. 25	Aug. 29	do	191,000
Fremont	Bkn.	328	May 1	Sept. 19	Okhotsk Sea	175,000
Jane A. Falkenburg	Bkn.	295	May 10	Sept. 23	do	136,000
Isabel	Sch.	175		(a)	Shumagin Islands	
Total		1,391				674,000
1889.						
Fremont	Bkn.	328	May 6	Sept. 25	Okhotsk Sea	170,000
Jane A. Falkenburg	Sch.	295	May 23	do	do	157,000
Total		623				327,000
1890.						
Vanderbilt	Sch.	92	Apr. 13	Aug. 4	Bering Sea	48,000
Jane A. Falkenburg	Sch.	295	May —	Oct. 3	Okhotsk Sea	140,000
Fremont	Bkn.	328	May 17	Oct. 6	do	177,000
Total		715				365,000
1891.						
CALIFORNIA.						
Francis Alice	Sch.	125	Jan. 11	July 7	Bering Sea	70,000
Dashing Wave	Sch.	141	Mar. 16	Apr. 16[a]		
Arago	Sch.	176	Apr. 16	Aug. 28	Bering Sea	87,000
Jane A. Falkenburg	Sch.	295	Apr. 25	Sept. 1	do	160,000
Fremont	Bkn.	328	May 6	Sept. 23	Okhotsk Sea	171,000
John Hancock	Sch.	167	June 10	Sept. 9	Bering Sea	70,000
Total		1,232				558,000

[a] Lost.

OPERATIONS OF THE COD FLEET BY YEARS—Continued.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Fishing grounds.	Number of fish taken.
1891.						
WASHINGTON.						
Lizzie Colby	Sch.	142	.....	.....	Bering Sea	25,000
1892.						
CALIFORNIA.						
Arago	Sch.	176	Apr. 10	Aug. 31	Bering Sea	90,000
Jane A. Falkenburg	Sch.	295	Apr. 27	Sept. 12	do	152,000
Fremont	Sch.	328	Apr. 28	Sept. 22	do	175,000
John Hancock	Sch.	167	May 6	Aug. 31	do	70,000
Hera	Sch.	369	May 19	Oct. 11	Okhotsk Sea	125,000
Total	.....	1,335	.....	.....	.....	612,000
WASHINGTON.						
Lizzie Colby	Sch.	142	Mar. 17	Aug. 30	Bering Sea	108,000
Moonlight	Sch.	68	Mar. 5	Aug. 20	do	55,000
Total	.....	210	.....	.....	.....	163,000
1893.						
CALIFORNIA.						
John Hancock	Sch.	167	Feb. 8	Mar. 7[a]	.....	.....
Francis Alice	Sch.	125	Feb. 24	.....	Shumagin Islands	.....
Arago	Sch.	176	Apr. 11	Aug. —	Bering Sea	90,000
Jane A. Falkenburg	Sch.	295	Apr. 20	Sept. 9	do	125,000
Hera	Sch.	369	Apr. 22	Sept. 26	Okhotsk Sea	166,000
Fremont	Sch.	328	Apr. 29	Sept. 10	do	175,000
Total	.....	1,460	.....	.....	.....	556,000
WASHINGTON.						
Lizzie Colby	Sch.	142	.....	.....	Bering Sea	110,000
1894.						
CALIFORNIA.						
Arago	Sch.	176	Mar. 29	Sept. 6	Bering Sea	90,000
Fremont	Bkn.	328	Mar. 31	Aug. 26	do	180,000
Jane A. Falkenburg	Sch.	295	do	Aug. 27	do	105,000
Hera	Sch.	369	Apr. 19	Sept. 10	Okhotsk Sea	169,000
Uranus	Sch.	225	Apr. 12	Sept. 16	Shumagin Islands and Bering Sea.	45,000
Total	.....	1,393	.....	.....	.....	589,000
WASHINGTON.						
Lizzie Colby	Sch.	142	.....	.....	Bering Sea	109,000
1895.						
CALIFORNIA.						
Fremont	Bkn.	328	Apr. 15	July 18	Bering Sea	159,000
Arago	Sch.	176	Apr. 17	July 20	Okhotsk Sea	89,000
Uranus	Sch.	225	Apr. 21	Aug. 11	Bering Sea	88,000
Jane A. Falkenburg	Sch.	295	Apr. 22	July 19	do	107,000
Hera	Sch.	369	Apr. 25	Sept. 17	Okhotsk Sea	159,000
Francis Alice	Sch.	125	.....	.....	Bering Sea	51,000
Total	.....	1,518	.....	.....	.....	653,000
WASHINGTON.						
Lizzie Colby	Sch.	142	Apr. 18	Aug. 9	Bering Sea	112,000

[a] Lost.

OPERATIONS OF THE COD FLEET BY YEARS—Continued.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Fishing grounds.	Number of fish taken.
1896.						
CALIFORNIA.						
Uranus	Sch.	225	Apr. 5	July 23	Bering Sea	81,000
La Ninfa	Sch.	119	Apr. 7	Sept. 2	do	50,000
Jane A. Falkenburg	Sch.	295	Apr. 11	Aug. 3	do	115,000
Fremont	Bkn.	328	Apr. 15	Aug. 5	do	167,000
Arago	Sch.	176	do	July 20	do	80,000
Hera	Sch.	369	Apr. 26	Sept. 9	Okhotsk Sea	125,000
Total		1,512				618,000
WASHINGTON.						
Lizzie Colby	Sch.	142			Bering Sea	109,000
Emma F. Harriman [a]	Bark.	366	Apr. 8	Sept. 13	do	110,000
Total		508				219,000
1897.						
CALIFORNIA.						
Arago	Sch.	176	Mar. 30	July 15	Bering Sea	90,000
Fremont	Bkn.	328	Apr. 2	Sept. 8	do	167,000
Jane A. Falkenburg	Sch.	295	do	Sept. 9	do	124,000
Hera	Sch.	369	Apr. 4	Sept. 13	do	133,000
Uranus	Sch.	225	Apr. 26	Aug. 21	do	40,000
Total		1,393				554,000
WASHINGTON.						
Lizzie Colby	Sch.	142			Bering Sea	114,000
Blakeley	Bgn.	144			do	100,000
Swan	Sch.	75			do	55,000
Total		361				269,000
1898.						
CALIFORNIA.						
Fremont	Bkn.	328	Apr. 5	Aug. 31	Bering Sea	152,000
Anna	Sch.	227		Oct. 2	do	95,000
Uranus	Sch.	225	May 9	Sept. 22	do	45,000
Total		780				292,000
WASHINGTON.						
Lizzie S. Sorrenson	Sch.	89			Bering Sea	50,000
1899.						
CALIFORNIA.						
Anna	Sch.	227	Mar. 30	Aug. 16	Bering Sea	117,000
Fremont	Bkn.	328	Apr. 1	Sept. 17	do	157,000
Arago	Sch.	176	Apr. 2	Sept. 13	do	80,000
Uranus	Sch.	225	Apr. 5	Aug. 25	do	83,000
Czarina	Sch.	218	Apr. 19	Oct. 1	do	143,000
Total		1,174				580,000
WASHINGTON.						
Lizzie Colby	Sch.	142			Bering Sea	93,000
Blakeley	Bgn.	144			do	110,000
Total		286				203,000

[a] Cargo was taken to San Francisco and sold there.

OPERATIONS OF THE COD FLEET BY YEARS—Continued.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Fishing grounds.	Number of fish taken.
1900.						
CALIFORNIA.						
Stanley	Sch.	253	Apr. 3	Sept. 1	Bering Sea	154,000
Fremont	Bkn.	328	...do	Aug. 30	...do	160,000
Abbie M. Deering	Sch.	96	Apr. 10	July 1	...do	45,000
Anna	Sch.	227	Apr. 9	Aug. 24	...do	95,000
Arago	Sch.	176	Apr. 13	Sept. 18	...do	80,000
Uranus	Sch.	225	Mar. 26	Sept. 13	...do	89,000
Total		1,305				623,000
WASHINGTON.						
Lizzie Colby	Sch.	142			Bering Sea	100,000
Blakeley	Bgn.	144			...do	94,000
Total		286				194,000
1901.						
CALIFORNIA.						
Uranus	Sch.	225	Mar. 27	July 7	Bering Sea	53,000
Fremont	Bkn.	328	Apr. 2	Aug. 18	...do	177,000
Harriet G	Brig.	188	Apr. 3	Sept. 7	...do	51,000
Stanley	Sch.	253	Apr. 11	Sept. 27	...do	195,000
City of Papeete	Bkn.	370	Apr. 13	Sept. 7	...do	151,000
Arago	Sch.	176	Apr. 16	Sept. 11	...do	75,000
Total		1,540				702,000
WASHINGTON.						
Lizzie Colby	Sch.	142			Bering Sea	85,000
1902.						
CALIFORNIA.						
Stanley	Sch.	253	Mar. 22	Aug. 25	Bering Sea	166,000
Fremont	Bkn.	328	Apr. 1	Aug. 18	...do	183,000
Uranus	Sch.	225	...do	Aug. 15	...do	51,000
Arago	Sch.	176	Apr. 4	Sept. 28	...do	72,000
Harriet G	Brig.	188	...do	Aug. 26	...do	135,000
City of Papeete	Bkn.	370	Apr. 11	Aug. 29	...do	217,000
Mary and Ida	Sch.	174	...do	Aug. 21	...do	102,000
J. G. Wall	Sch.	93	June 15	Sept. 8	...do	7,000
Anna [a]	Sch.	227				
Total		2,034				933,000
WASHINGTON.						
Lizzie Colby	Sch.	142			Bering Sea	104,000
Carrier Dove	Sch.	82			...do	85,000
Total		224				189,000
BRITISH COLUMBIA.						
Blakeley	Bgn.	144			Bering Sea	107,000
1903.						
CALIFORNIA.						
Mary and Ida	Sch.	174	Mar. 20	Aug. 23	Bering Sea	105,000
Arago	Sch.	176	Mar. 22	July 29	...do	75,000
Fremont	Bkn.	328	Mar. 28	Sept. 2	...do	179,000
Uranus	Sch.	225	Apr. 1	Aug. 21	...do	76,300
City of Papeete	Bkn.	370	...do	Aug. 12	...do	200,000
Harriet G	Brig.	188	Apr. 2	Aug. 29	...do	112,000
Emma Claudina	Sch.	185	Apr. 9	...do	...do	120,000
Stanley	Sch.	253	Apr. 21	Sept. 18	Okhotsk Sea	170,000
Total		1,899				1,037,300

[a] Lost in Bering Sea.

OPERATIONS OF THE COD FLEET BY YEARS—Continued.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Fishing grounds.	Number of fish taken.
1903.						
WASHINGTON.						
Lizzie Colby	Sch.	142	.....	.....	Bering Sea	84,500
Carrier Dove	Sch.	82	.....	.....	North Pacific [a]	95,000
Nellie Colman	Sch.	122	.....	.....	Bering Sea	132,000
Total	.....	346	.....	.....	.....	311,500
BRITISH COLUMBIA.						
Blakeley	Bgn.	144	.....	Sept. 15	Bering Sea	115,000
1904.						
CALIFORNIA.						
Arago	Sch.	176	Mar. 31	July 13	Shumagin Islands	69,200
Uranus	Sch.	225	...do.....	Sept. 12	Bering Sea	60,000
Harriet G	Brig.	188	...do.....	Sept. 1	.....do	140,000
Stanley	Sch.	253	Apr. 3	Sept. 10	.....do	165,000
Fremont	Bkn.	328	Apr. 7	...do.....	.....do	193,000
City of Papeete	Bkn.	370	Apr. 11	...do.....	.....do	212,000
Metha Nelson	Sch.	399	May 15	Oct. 11	Okhotsk Sea	223,000
Total	.....	1,939	.....	.....	.....	1,062,200
WASHINGTON.						
Lizzie Colby	Sch.	142	.....	.....	Bering Sea	98,000
Alice	Sch.	220	.....	.....	.....do	128,324
Ida May	Sch.	33	.....	.....	.....do	14,000
Nellie Colman	Sch.	122	.....	July 27	.....do	97,000
Carrier Dove	Sch.	82	.....	...do.....	.....do	47,000
Total	.....	599	.....	.....	.....	384,324
BRITISH COLUMBIA.						
Blakeley	Bgn.	144	.....	Sept. —	Bering Sea	100,000
1905.						
CALIFORNIA.						
Zampa	Sch.	322	Mar. 30	Sept. 8	Bering Sea	125,133
Glen	Sch.	121	Apr. 8	Aug. 24	.....do	65,000
John F. Miller	Sch.	170	Apr. 1	Aug. 25	.....do	75,000
Harriet G	Sch.	188	Mar. 30	Sept. 3	.....do	110,000
Stanley	Sch.	253	Mar. 26	Sept. 5	.....do	135,000
Fremont	Bkn.	328	Mar. 30	Sept. 14	.....do	190,000
John D. Spreckles	Bkn.	253	May 5	Sept. 29	Okhotsk Sea	133,000
S. N. Castle	Bgn.	464	Apr. 27	Sept. 27	.....do	210,000
W. H. Dimond	Sch.	376	...do.....	...do.....	.....do	150,000
City of Papeete	Bkn.	370	...do.....	Oct. 7	.....do	143,000
Pearl	Sch.	83	(b)	.....	Bering Sea	.....
Total	.....	2,928	.....	.....	.....	1,336,133
WASHINGTON.						
Harold Blekum	Sch.	185	Mar. 13	Aug. 23	Bering Sea	123,000
Ida May	Sch.	33	Apr. 20	July 5	.....do	10,000
Nellie Colman	Sch.	122	Apr. 18	Aug. 12	.....do	50,000
Carrier Dove	Sch.	82	Apr. 1	...do.....	.....do	40,000
Joseph Russ	Sch.	235	Apr. 8	Aug. 31	.....do	164,000
Alice	Sch.	220	Apr. 1	Aug. 21	.....do	173,000
Fanny Dutard	Sch.	252	Apr. 15	Sept. 4	.....do	195,000
Lizzie Colby	Sch.	142	Apr. 10	Aug. 15	.....do	103,000
Falcon	Sch.	195	May 9	Sept. 1	.....do	60,000
Total	.....	1,466	.....	.....	.....	918,000
BRITISH COLUMBIA.						
Blakeley	Bkn.	144	Apr. 15	Sept. 29	Bering Sea	78,000

[a] Virtually the same ground as the Shumagin Islands. [b] Lost.

OPERATIONS OF THE COD FLEET BY YEARS—Continued.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Fishing grounds.	Number of fish taken.
1906.						
CALIFORNIA.						
W. H. Dimond	Sch.	376	Apr. 4	Oct. 3	Okhotsk Sea	140,000
Zampa	Sch.	322	Apr. 9	Oct. 10	Bering Sea	160,000
City of Papeete	Bkn.	370	Apr. 11	...do	.....do	181,000
Fremont	Bkn.	328	Mar. 16	Sept. 9	Okhotsk Sea	159,000
Stanley	Sch.	253	Apr. 4	Sept. 2	Bering Sea	140,000
Harriet G	Brig.	188	Mar. 15	Sept. 4	Okhotsk Sea	141,000
John D. Spreckles	Sch.	253	Mar. 22	...do	Bering Sea	80,000
S. N. Castle	Bkn.	464	Apr. 8	Sept. 24	Okhotsk Sea	219,000
Glen	Sch.	121	Mar. 25	Sept. 4	Bering Sea	85,000
Ottillie Fjord	Sch.	247	Mar. 28	Sept. 9	.....do	140,000
Dora Bluhm	Sch.	315	May 2	Sept. 11	Okhotsk Sea	33,000
Total		3,237				1,478,000
WASHINGTON.						
Carrier Dove	Sch.	82	Apr. 3	Sept. 10	North Pacific	48,000
Fanny Dutard	Sch.	252	Apr. 10	Aug. 30	Bering Sea	198,000
Lizzie Colby	Sch.	142	Apr. 14	Aug. 23	.....do	107,000
Maid of Orleans	Sch.	171	Apr. 24	Sept. 10	North Pacific	120,000
Harold Blekum	Sch.	185	Mar. 10	Aug. 14	.....do	112,000
Fortuna	Sch.	138	Apr. 18	Aug. 4	Bering Sea	70,000
Joseph Russ	Sch.	235	Mar. 20	Aug. 19	.....do	197,007
Alice	Sch.	220	Mar. 27	Aug. 17	.....do	162,611
Total		1,425				1,014,618
1907.						
CALIFORNIA.						
City of Papeete	Bkn.	370	Apr. 10	Sept. 29	Bering Sea	120,000
Stanley	Sch.	253	Mar. 22	Aug. 31	Okhotsk Sea	140,000
Fremont	Bkn.	328	Apr. 24	Sept. 29	.....do	108,000
John D. Spreckles	Sch.	253	Apr. 10	July 22	.....do	5,800
S. N. Castle	Bkn.	464	Apr. 18	July 14	.....do	18,000
Ottillie Fjord	Sch.	247	Mar. 26	Sept. 14	Bering Sea	135,000
John F. Miller	Sch.	170	Apr. 7	Aug. 29	.....do	90,000
Dora Bluhm	Sch.	315	Apr. 14	Sept. 20	.....do	125,000
Total		2,400				741,800
WASHINGTON.						
Fanny Dutard	Sch.	252	Apr. 26	Sept. 16	Bering Sea	180,000
Carrier Dove	Sch.	82	Mar. 20	...do	.....do	98,500
Harold Blekum	Sch.	185	Mar. 19	Aug. 22	.....do	113,000
Alice	Sch.	220	Apr. 15	Sept. 2	.....do	165,000
Joseph Russ	Sch.	235	...do	Aug. 22	.....do	191,930
Total		974				748,430
1908.						
CALIFORNIA.						
W. H. Dimond	Sch.	376	Apr. 9	Oct. 18	Bering Sea	138,000
City of Papeete	Bkn.	370	Mar. 21	Aug. 24	Okhotsk Sea	118,000
Stanley	Sch.	253	Mar. 13	Sept. 16	.....do	152,000
Fremont	Bkn.	328	Mar. 21	...do	.....do	150,000
Ottillie Fjord	Sch.	247	Mar. 28	Sept. 4	Bering Sea	125,000
Dora Bluhm	Sch.	315	Apr. 18	Oct. 16	.....do	120,000
City of Papeete	Bkn.	370	Mar. 21	Aug. 24	.....do	107,000
Total		2,259				910,000
WASHINGTON.						
Fanny Dutard	Sch.	252	Apr. 5	Sept. 6	Bering Sea	160,000
Harriet G	Brig.	188	Apr. 18	Sept. 15	.....do	115,000
Maid of Orleans	Sch.	171	Apr. 15	Aug. 26	.....do	102,000
Harold Blekum	Sch.	185	Mar. 31	Sept. 3	.....do	170,000
Vega	Sch.	233	Apr. 5	...do	.....do	102,000
Fortuna	Sch.	138	Apr. 13	Aug. 11	North Pacific	110,000
Alice	Sch.	220	Mar. 28	Aug. 23	Bering Sea	165,000
Joseph Russ	Sch.	235	...do	Aug. 24	.....do	194,000
Total		1,622				1,118,000

OPERATIONS OF THE COD FLEET BY YEARS—Continued.

Name of vessel.	Rig	Net tonnage.	Date of sailing.	Date of return.	Fishing grounds.	Number of fish taken.
1909.						
CALIFORNIA.						
John D. Spreckles	Sch.	253	Mar. 18	Sept. 8	Bering Sea	115,000
City of Papeete	Bkn.	370	Apr. 15	Sept. 2	do	155,000
Czarina	Sch.	218	Mar. 25	Sept. 8	do	115,000
Ottillie Fjord	Sch.	247	Mar. 28	Sept. 5	do	135,000
Fremont	Bkn.	328	Apr. 14	Oct. 4	Okhotsk Sea	80,000
Total		1,416				600,000
WASHINGTON.						
Fanny Dutard	Sch.	252	Apr. 8	Sept. 7	Bering Sea	170,000
Harriet G	Sch.	188	do	Sept. 13	do	122,000
Maid of Orleans	Sch.	171	do	Aug. 20	do	115,000
Harold Blekum	Sch.	185	Mar. 28	Aug. 13	do	110,000
Vega	Sch.	233	Apr. 8	Sept. 7	do	155,000
Fortuna	Sch.	138	Apr. 7	Aug. 16	do	102,000
Alice	Sch.	220	Apr. 8	do	do	170,000
Joseph Russ	Sch.	235	do	Aug. 24	do	204,155
Total		1,622				1,148,155
1910.						
CALIFORNIA.						
W. H. Dimond	Sch.	376	Mar. 3	Sept. 16	Bering Sea	150,000
City of Papeete	Bkn.	370	Mar. 26	Sept. 15	do	120,000
Fremont	Bkn.	328	Mar. 25	Oct. 1	do	110,000
Total		1,074				380,000
WASHINGTON.						
Fanny Dutard	Sch.	252	Apr. 20	Sept. 5	Bering Sea	185,500
Alice	Sch.	220	Apr. 21	Sept. 15	do	175,000
Joseph Russ	Sch.	235	Apr. 17	Sept. 12	do	180,000
Maid of Orleans	Sch.	171	Apr. 15	Aug. 15	do	116,000
Vega	Sch.	233	Apr. 14	Sept. 15	do	150,000
Fortuna	Sch.	138	Apr. 15	Sept. 4	do	105,000
Total		1,249				911,500
1911.						
CALIFORNIA.						
W. H. Dimond	Sch.	376	Mar. 28	Sept. 6	Bering Sea	176,000
City of Papeete	Bkn.	370	Mar. 25	Aug. 31	do	180,000
Ottillie Fjord	Sch.	247	Mar. 31	Sept. 7	do	83,000
Total		993				439,000
WASHINGTON.						
Fanny Dutard	Sch.	252	Apr. 14	Aug. 23	Bering Sea	201,000
Alice	Sch.	220	Mar. 30	Sept. 13	do	170,000
Joseph Russ	Sch.	235	Apr. 1	Aug. 23	do	204,000
John A	Sch.	235	Apr. 20	Sept. 6	do	165,000
Fortuna	Sch.	138	Mar. 31	Aug. 10	do	130,000
Vega	Sch.	233	Apr. 11	Sept. 19	do	165,000
Maid of Orleans	Sch.	171	Apr. 15	Sept. 7	do	68,000
Total		1,484				1,103,000
1912.						
CALIFORNIA.						
Vega	Sch.	233	Apr. 18	Sept. 17	North Pacific	139,000
W. H. Dimond	Sch.	376	Mar. 25	Aug. 29	Bering Sea	180,000
City of Papeete	Sch.	370	Mar. 28	Aug. 23	do	180,000
Ottillie Fjord	Sch.	247	Mar. 23	Sept. 5	do	75,000
Galilee	Sch.	328	Mar. —	Sept. 19	do	90,000
Total		1,554				664,000

OPERATIONS OF THE COD FLEET BY YEARS—Continued.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Fishing grounds.	Number of fish taken.
1912.						
WASHINGTON.						
Maid of Orleans	Sch.	171	Apr. 12	Aug. 26	Bering Sea	101,000
Fanny Dutard	Sch.	252	Apr. 10	Aug. 14	do	189,000
Alice	Sch.	220	Apr. 5	Sept. 8	do	171,000
Joseph Russ	Sch.	235	Apr. 7	[a]Apr. 21		
Fortuna	Sch.	138	Apr. 11	Sept. 17	Bering Sea	89,000
John A	Sch.	235	Apr. 12	Sept. 15	North Pacific	134,000
Total		1,251				684,000
1913.						
CALIFORNIA.						
Galilee	Sch.	328	Mar. 7	Sept. 9	Bering Sea	145,000
Vega	Sch.	233	Feb. 6	Sept. 14	North Pacific	130,000
William H. Dimond	Sch.	376	Mar. 19	Aug. 20	Bering Sea	160,000
City of Papeete	Bkn.	370	Mar. 13	Aug. 27	do	183,000
Ottillie Fjord	Sch.	247	Mar. 18	Aug. 26	do	99,000
Total		1,554				717,000
WASHINGTON.						
Maid of Orleans	Sch.	171	Apr. 13	Sept. 10	Bering Sea	105,000
Fanny Dutard	Sch.	252	Apr. 11	do	do	195,000
Alice	Sch.	220	Mar. 27	Sept. 2	do	137,000
John A	Sch.	235	Apr. 5	Sept. 15	North Pacific	140,000
Chas. R. Wilson	Sch.	328	Apr. 2	Sept. 2	Bering Sea	187,000
Total		1,206				764,000
BRITISH COLUMBIA.						
Albert Meyer	Sch.	398	Aug. —	Oct. 16	Bering Sea	260
1914.						
CALIFORNIA.						
Sequoia	Sch.	324	Mar. 21	Sept. 9	Bering Sea	152,000
Galilee	Sch.	328	Mar. 24	Sept. 12	do	166,000
Vega	Sch.	233	Mar. 17	Aug. 26	North Pacific	150,000
City of Papeete	Bkn.	370	Mar. 23	Sept. 3	Bering Sea	187,000
Glendale	Sch.	281	do	Sept. 6	do	155,202
Ottillie Fjord	Sch.	247	Mar. 18	Sept. 3	do	121,000
Total		1,783				931,202
WASHINGTON.						
Azalea	Sch.	327	Apr. 6	Sept. 11	Bering Sea	212,000
Fanny Dutard	Sch.	252	Apr. 5	Sept. 15	do	172,000
Fortuna	Sch.	138	Apr. 2	Sept. 8	do	96,000
Alice	Sch.	220	Mar. 25	Sept. 15	do	171,000
Wawona	Sch.	413	Apr. 1	Sept. 11	do	240,000
John A	Sch.	235	Apr. 7	Sept. 13	do	100,000
Chas. R. Wilson	Sch.	328	Apr. 2	Sept. 7	North Pacific	209,000
Maid of Orleans	Sch.	171	Apr. 7	Sept. 13	Bering Sea	52,000
Total		2,084				1,252,000
BRITISH COLUMBIA.						
Albert Meyer	Sch.	398	Mar. 23	Sept. 9	Bering Sea	100,000
1915.						
CALIFORNIA.						
Sequoia	Sch.	324	Mar. 16	Aug. 13	Bering Sea	228,500
Galilee	Sch.	328	Mar. 24	Sept. 5	do	195,000
Vega	Sch.	233	Mar. 17	Aug. 26	North Pacific	119,000
Maweema	Sch.	392	Mar. 25	Sept. 7	Bering Sea	235,000
City of Papeete	Sch.	370	Mar. 23	Aug. 19	do	195,000
Glendale	Sch.	281	Mar. 20	Aug. 13	do	161,000
Ottillie Fjord	Sch.	247	Mar. 19	Aug. 27	do	120,000
Total		2,175				1,253,500

[a] Lost.

OPERATIONS OF THE COD FLEET BY YEARS—Continued.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Fishing grounds.	Number of fish taken.
1915.						
WASHINGTON.						
Azalea	Sch.	327	Apr. 12	Sept. 6	Bering Sea	206,000
Fanny Dutard	Sch.	252	Apr. 10	Sept. 4	do	188,000
Fortuna	Sch.	138	Mar. 23	Aug. 22	do	110,000
Alice	Sch.	220	Apr. 10	Sept. 6	do	167,248
Wawona	Sch.	413	Apr. 14	Aug. 21	do	258,323
John A	Sch.	235	Apr. 12	Sept. 30	North Pacific	154,000
Chas. R. Wilson	Sch.	328	Apr. 10	Sept. 4	Bering Sea	181,000
Maid of Orleans	Sch.	171	Apr. 3	do	do	110,000
Total		2,084				1,374,571
ALASKA.						
Highland Queen	Gas. s.	12	(a)		North Pacific	5,000
Challenge	Gas. s.	35			do	12,500
Silver Wave	Gas. s.	19			do	8,000
Miscellaneous power vessels	Gas. s.	101			do	80,000
Total		167				105,500

a Wrecked about Apr. 20.

SUMMARY OF THE SHORE-STATION DATA.

The following table shows, in a condensed form, the data relating to the vessels plying to and from the Alaska shore stations and the fish brought from thence to the home stations. These transporting vessels usually make several trips each year, and in some instances fishing vessels are utilized for this purpose when not engaged in fishing. The total fish transported represent the catches made at the various shore stations.

SUMMARY OF SHORE-STATION DATA.

Year.	Number of vessels.	Net tonnage.	Number of trips.	Number of cod brought to California.	Number of cod brought to Washington.	Total number from shore stations.
1876	1	114	1	30,000		30,000
1877	1	114	1	101,000		101,000
1878	3	190	6	227,000		227,000
1879	1	64	4	198,000		198,000
1880	2	172	4	201,000		201,000
1881	1	64	3	154,000		154,000
1882	1	108	3	203,000		203,000
1883	2	245	4	235,000		235,000
1884	1	137	3	249,000		249,000
1885	2	278	4	386,000		386,000
1886	3	454	5	383,000		383,000
1887	1	137	3	299,000		299,000
1888	2	285	4	372,000		372,000
1889	4	823	7	489,000		489,000
1890	4	621	9	773,000		773,000
1891	4	624	7	662,000		662,000
1892	2	388	4	700,000		700,000
1893	2	366	4	660,000		660,000
1894	1	218	2	305,000		305,000
1895	1	218	2	286,000		286,000
1896	1	125	1			No report.
1897	4	652	6	511,000		511,000
1898	6	930	9	450,000		450,000
1899	6	975	11	722,000		722,000

SUMMARY OF SHORE-STATION DATA—Continued.

Year.	Number of vessels.	Net tonnage.	Number of trips.	Number of cod brought to California.	Number of cod brought to Washington.	Total number from shore stations.
1900	5	898	9	909,000	.....	909,000
1901	5	907	8	727,000	.....	727,000
1902	6	1,080	11	1,140,000	.....	1,140,000
1903	4	631	11	985,000	.....	985,000
1904	6	1,100	10	959,000	43,000	1,002,000
1905	6	1,384	10	1,274,000	[a] 8,000	1,282,000
1906	11	2,117	15	890,632	130,000	1,020,632
1907	7	1,153	14	[b] 1,116,951	402,000	1,518,951
1908	9	2,281	12	994,403	152,000	1,146,403
1909	8	2,134	9	897,361	[c] 13,000	910,361
1910	3	724	7	680,600	[c] 2,875	683,475
1911	7	1,836	9	909,000	[d] 83,000	992,000
1912	4	1,040	7	960,984	[c] 36,950	997,934
1913	6	1,397	6	[e] 657,847	[c] 146,250	804,097
1914	6	1,465	11	1,481,000	[c] 104,600	1,585,600
1915	3	719	7	1,114,400	30,100	1,144,500
Total	.....	.....	.....	24,293,178	1,151,775	25,444,953

[a] Schooner *Nellie Colman*, from Seattle, lost with 30 lives.
[b] Schooner *Glen*, from San Francisco, lost with 28,000 fish.
[c] Shipped on regular steamship lines.
[d] Eight thousand of these were shipped on regular steamers.
[e] Schooner *John D. Spreckles*, of San Francisco, lost with 145,000 cod aboard.

DETAILED OPERATIONS OF THE TRANSPORTING FLEET FROM 1876 TO 1915.

The table which follows shows in detail the cod shipped from the shore fishing stations in Alaska, from 1876, when the first station was established, to 1915, both inclusive. The name, rig, and tonnage of the transporting vessel is shown, together with the dates of departure from and arrival at the home station, also the number of cod brought.[a] From 1876 to 1903, both inclusive, the data relate exclusively to California.

OPERATIONS OF THE TRANSPORTING FLEET BY YEARS.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Number of fish brought.
1876.					
CALIFORNIA.[b]					
Wild Gazelle	Sch.	114	Oct. 18	.....	30,000
1877.					
Wild Gazelle	Sch.	114	Sept. 24	Nov. 18	101,000
1878.					
Alaska	Sch.	32	Mar. 18	June 15	22,000
Do	.....	.....	June 24	Sept. 15	12,000
Alfred Adams	Sch.	64	Apr. 4	June 22	51,000
Do	.....	.....	July 9	Aug. 29	46,000
Do	.....	.....	Sept. 10	Nov. 9	51,000
Ariel	Sch.	94	.....	June 25	45,000
Total	.....	.....	.....	.....	227,000

[a] For the data relating to the fleet of transporters owned and operated from San Francisco the writer is indebted to the very complete and accurate records kept by the Union Fish Co. (formerly the McCollam Fishing & Trading Co.), of San Francisco.
[b] From 1876 to 1903, inclusive, the data relate to California exclusively.

OPERATIONS OF THE TRANSPORTING FLEET BY YEARS—Continued.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Number of fish brought.
1879.					
Alfred Adams	Sch.	64	Mar. 12	Apr. 25	56,000
Do	.....	.....	May 13	June 29	57,000
Do	.....	.....	July 11	Aug. 25	45,000
Do	.....	.....	Sept. 2	Oct. 14	40,000
Total	.....	.....	.....	.....	198,000
1880.					
Alfred Adams	Sch.	64	Mar. 16	May 8	42,000
Do	.....	.....	May 17	June 25	52,000
Do	.....	.....	July 3	Aug. 16	45,000
Wild Gazelle	Sch.	108	Sept. 11	Oct. 23	62,000
Total	.....	.....	.....	.....	201,000
1881.					
Alfred Adams	Sch.	64	Mar. 21	May 31	52,000
Do	.....	.....	June 7	July 19	51,000
Do	.....	.....	July 26	Sept. 18	51,000
Total	.....	.....	.....	.....	154,000
1882.					
Wild Gazelle	Sch.	108	Mar. 18	May 16	60,000
Do	.....	.....	June 2	July 28	83,000
Do	.....	.....	Aug. 12	Oct. 2	60,000
Total	.....	.....	.....	.....	203,000
1883.					
Wild Gazelle	Sch.	108	Mar. 20	June 14	85,000
Do	.....	.....	June 21	Aug. 3	90,000
Do	.....	.....	Aug. 15	(a)	.....
Czar	Sch.	137	Oct. 3	Nov. 10	60,000
Total	.....	.....	.....	.....	235,000
1884.					
Czar	Sch.	137	Mar. 23	June 14	102,000
Do	.....	.....	June 25	Aug. 14	97,000
Do	.....	.....	Sept. 16	Nov. 5	50,000
Total	.....	.....	.....	.....	249,000
1885.					
Czar	Sch.	137	Mar. 12	Apr. 20	68,000
Do	.....	.....	May 8	June 30	120,000
Do	.....	.....	July 19	Sept. 19	98,000
Dashing Wave	Sch.	141	Apr. 1	June 11	100,000
Total	.....	.....	.....	.....	386,000
1886.					
Arago	Sch.	176	Jan. 7	Sept. 18	60,000
Dashing Wave	Sch.	141	Mar. 14	May 30	58,000
Czar	Sch.	137	Apr. 1–4	May 24	99,000
Do	.....	.....	June 13	Aug. 10	101,000
Do	.....	.....	Aug. 28	Oct. 10	65,000
Total	.....	.....	.....	.....	383,000
1887.					
Czar	Sch.	137	Apr. 2	May 20	125,000
Do	.....	.....	June 11	Aug. 7	99,000
Do	.....	.....	Aug. 25	Oct. 15	75,000
Total	.....	.....	.....	.....	299,000

a Lost Aug. 19.

OPERATIONS OF THE TRANSPORTING FLEET BY YEARS—Continued.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Number of fish brought.
1888.					
Czar	Sch.	137	Mar. 12	May 14	131,000
Do	.....	.....	June 3	Aug. 8	115,000
Do	.....	.....	Aug. 26	Oct. 31	55,000
Eliza Miller	Sch.	148	Aug. 30	Oct. 25	71,000
Total	.....	.....	.....	.....	372,000
1889.					
Czar	Sch.	137	Feb. 11	Apr. 6	132,000
Do	.....	.....	May 2	June 25	127,000
Do	.....	.....	July 10	Sept. 1	66,000
Dashing Wave	Sch.	141	Mar. 21	June 28	95,000
Do	.....	.....	July 12	Oct. 8	.....
Arago	Sch.	176	Apr. 5	Aug. 21	65,000
Hera	Sch.	369	.....	.....	4,000
Total	.....	.....	.....	.....	489,000
1890.					
Czar	Sch.	137	Feb. 10	Apr. 7	115,000
Do	.....	.....	Apr. 19	June 17	117,000
Do	.....	.....	June 29	Aug. 30	103,000
Do	.....	.....	Sept. 13	Nov. 12	45,000
Dashing Wave	Sch.	141	Mar. 12	May 26	80,000
Do	.....	.....	June 15	July 26	80,000
Do	.....	.....	.....	Oct. 22	70,000
John Hancock	Sch.	167	Mar. 16	Aug. 19	45,000
Arago	Sch.	176	Mar. 22	Aug. 12	118,000
Total	.....	.....	.....	.....	773,000
1891.					
John Hancock	Sch.	167	Jan. 7	May 31	85,000
Czar	Sch.	137	Feb. 12	Apr. 21	110,000
Do	.....	.....	May 5	July 3	122,000
Do	.....	.....	July 15	Sept. 1	130,000
Do	.....	.....	Sept. 13	Nov. 13	75,000
Blakeley	Bgn.	144	May 30	Aug. 21	90,000
Arago	Sch.	176	Sept. 10	Nov. 8	50,000
Total	.....	.....	.....	.....	662,000
1892.					
Czarina	Sch.	218	Jan. 30	Apr. 17	210,000
Do	.....	.....	May 14	July 11	240,000
Do	.....	.....	Aug. 18	Oct. 31	100,000
John F. Miller	Sch.	170	Apr. 30	June 28	150,000
Total	.....	.....	.....	.....	700,000
1893.					
Czarina	Sch.	218	Feb. 3	Apr. 28	240,000
Do	.....	.....	May 18	July 18	215,000
Do	.....	.....	Aug. 19	Oct. 27	75,000
Eliza Miller	Sch.	148	May 14	.....	130,000
Total	.....	.....	.....	.....	660,000
1894.					
Czarina	Sch.	218	Apr. 5	June 28	190,000
Do	.....	.....	Aug. 4	Oct. 10	115,000
Total	.....	.....	.....	.....	305,000
1895.					
Czarina	Sch.	218	Mar. 7	May 18	126,000
Do	.....	.....	Aug. 4	Oct. 18	160,000
Total	.....	.....	.....	.....	286,000

OPERATIONS OF THE TRANSPORTING FLEET BY YEARS—Continued.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Number of fish brought.
1896.					
Francis Alice	Sch.	125	Aug. 28	.....	(a)
1897.					
Eliza Miller	Sch.	148	Jan. 4	Feb. 17	77,000
Czarina	Sch.	218	Sept. 12[b]	Apr. 26	11[illegible],000
Mary and Ida	Sch.	174	May 7	Sept. 9	90,000
Winchester	Sch.	112	May 25	Sept. 3	47,000
Czarina	Sch.	218	June 23	Sept. 8	144,000
Mary and Ida	Sch.	174	Feb. 4	Apr. 27	35,000
Total	.....	.....	.....	.....	511,000
1898.					
Czarina	Sch.	218	Sept. 30[c]	Mar. 7	17,000
Winchester	Sch.	112	Sept. 20[c]	Mar. 10	101,000
Do	.....	.....	Mar. 24	June 17	30,000
Czarina	Sch.	218	Apr. 7	Sept. 7	118,000
Arago	Sch.	176	Oct. 3[c]	Apr. 10	26,000
Francis Alice	Sch.	125	.....	June 11	52,000
Mary and Ida	Sch.	174	Aug. —	Sept. 27	47,000
Francis Alice	Sch.	125	Sept. 29	Dec. 16	28,000
Winchester	Sch.	112	June 26	Oct. 31	31,000
Total	.....	.....	.....	.....	450,000
1899.					
Winchester	Sch.	112	Jan. 3	Mar. 9	40,000
Arago	Sch.	176	Aug. 2[d]	Jan. 20	25,000
Francis Alice	Sch.	125	Dec. 29[d]	Feb. 25	61,000
Do	.....	.....	Mar. 11	June 5	78,000
Winchester	Sch.	112	Mar. 17	May 19	63,000
Czarina	Sch.	218	Sept. 28[d]	Apr. 3	71,000
John F. Miller	Sch.	170	May 5	July 5	79,000
Winchester	Sch.	112	June 4	Aug. 1	36,000
Mary and Ida	Sch.	174	Oct. 30[d]	July 28	75,000
Do	.....	.....	Aug. 25	Dec. 12	129,000
Francis Alice	Sch.	125	Oct. 21	Dec. 20	65,000
Total	.....	.....	.....	.....	722,000
1900.					
Anna	Sch.	227	Jan. 6	Mar. 27	90,000
Czarina	Sch.	218	Jan. 17	Mar. 23	170,000
Mary and Ida	Sch.	174	Mar. 19	Aug. 2	106,000
Arago	Sch.	176	Oct. 12[e]	Mar. 27	35,000
Czarina	Sch.	218	Apr. 11	June 28	192,000
Winchester	Sch.	112	Oct. 1[e]	May 10	55,000
Do	.....	.....	May 23	Aug. 8	57,000
Czarina	Sch.	218	July 22	Oct. 20	123,000
Mary and Ida	Sch.	174	Aug. 21	Nov. 14	81,000
Total	.....	.....	.....	.....	909,000
1901.					
Arago	Sch.	176	Oct. 9[f]	Mar. 21	31,000
Mary and Ida	Sch.	174	Mar. 24	Aug. 27	95,000
Winchester	Sch.	112	Apr. 7	June 26	85,000
Czarina	Sch.	218	Nov. 3[f]	Apr. 15	165,000
Anna	Sch.	227	Nov. 21[f]	(g)	.....
Czarina	Sch.	218	May 6	July 13	206,000
Winchester	Sch.	112	July 13	Sept. 15	85,000
Do	.....	.....	Oct. 8	Nov. 23	60,000
Total	.....	.....	.....	.....	727,000

[a] Catch not reported.
[b] 1896.
[c] 1897.
[d] 1898.
[e] 1899.
[f] 1900.
[g] Lost Company Harbor, Sannak Island, Mar. 3, 1901.

OPERATIONS OF THE TRANSPORTING FLEET BY YEARS—Continued.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Number of fish brought.
1902.					
Mary and Ida	Sch.	174	Sept. 29[a]	Jan. 14	16,000
Pearl	Sch.	120	Feb. 2	May 15	60,000
Czarina	Sch.	218	Oct. 6[a]	Feb. 16	167,000
Arago	Sch.	176	Oct. 26[a]	Mar. 10	45,000
Czarina	Sch.	218	Mar. 16	May 29	208,000
Mary and Ida	Sch.	174	Feb. 5	Mar. 20	125,000
Pearl	Sch.	120	May 24	July 9	60,000
Czarina	Sch.	218	June 20	Aug. 25	208,000
Stanley	Sch.	253	Sept. 14	Nov. 11	112,000
Mary and Ida	Sch.	174	Sept. 16	Nov. 28	48,000
Viking	Sch.	139	.....	Aug. 1	91,000
Total	.....	.....	.....	.....	1,140,000
1903.					
Pearl	Sch.	120	Dec. 7[b]	Jan. 28	18,000
Czarina	Sch.	218	Jan. 28	Mar. 30	135,000
Pearl	Sch.	120	Feb. 12	Mar. 26	22,000
Volante	Sch.	119	Mar. 10	June 6	150,000
Pearl	Sch.	120	Apr. 9	May 28	68,000
Czarina	Sch.	218	Apr. 12	July 18	192,000
Pearl	Sch.	120	June 5	July 26	66,000
Do	.....	.....	Aug. 11	Oct. 6	54,000
Czarina	Sch.	218	...do	Nov. 9	180,000
Pearl	Sch.	120	Oct. 26	Dec. 28	30,000
Mary and Ida	Sch.	174	Sept. 30	Dec. 24	70,000
Total	.....	.....	.....	.....	985,000
1904.					
CALIFORNIA.					
Czarina	Sch.	218	Jan. 17	Mar. 24	144,000
Mary and Ida	Sch.	174	...do.....	(c)	.....
Pearl	Sch.	120	Jan. 19	Mar. 24	55,000
John D. Spreckles	Sch.	253	Apr. 10	June 22	146,000
Pearl	Sch.	120	...do	Aug. 10	38,000
Czarina	Sch.	218	Apr. 11	June 23	204,000
Do	.....	.....	July 22	Oct. 3	180,000
Pearl	Sch.	120	Sept. 27	Nov. 18	30,000
John D. Spreckles	Sch.	253	Aug. 11	Nov. 26	162,000
Total	.....	.....	.....	.....	959,000
WASHINGTON.					
Carrier Dove	Sch.	82	.....	Feb. 20	43,000
1905.					
CALIFORNIA.					
Czarina	Sch.	218	Jan. 16	Mar. 19	125,000
Do	.....	.....	Apr. 1	July 18	163,000
Do	.....	.....	Aug. 17	Nov. 5	144,000
Annie Larsen	Sch.	326	Apr. 5	June 10	252,000
Stanley	Sch.	253	Oct. 23[d]	Jan. 29	205,000
Do	.....	.....	Oct. 10	.....	.....
John D. Spreckles	Sch.	253	Oct. 24	Dec. 1	.....
W. H. Dimond	Sch.	376	Jan. 18	Mar. 22	150,000
Zampa	Sch.	322	Oct. 12	.....	.....
Marion	Sch.	223	Apr. 1	June 18	145,000
Do	.....	.....	July 18	Sept. 24	90,000
John F. Miller	Sch.	170	Oct. 7	.....	.....
Glen	Sch.	121	Sept. 19	.....	.....
Total	.....	.....	.....	.....	1,274,000
WASHINGTON.					
From Kodiak	.....	.....	July 10	Oct. 12	8,000
Nellie Colman	Sch.	122	Oct. 1	(e)	.....

[a] 1901.
[b] 1902.
[c] Lost on Unga Island, Feb. 23, 1904 had 78,000 fish aboard.
[d] 1904.
[e] Wrecked.

OPERATIONS OF THE TRANSPORTING FLEET BY YEARS—Continued.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Number of fish brought.
1906.					
CALIFORNIA.					
Marion	Sch.	223	(a)	Mar. 12	20,000
Do	.....	.....	Mar. 19	(b)	.....
Czarina	Sch.	218	Feb. 26	July 19	152 349
Do	.....	.....	Aug. 13	Oct. 29	98,000
Stanley	Sch.	253	Oct. 10c	Mar. 10	63,000
Alpha	Sch.	274	Mar. 12	June 10	244,283
John F. Miller	Sch.	170	Oct. 7c	Mar. 17	25,000
Do	.....	.....	Apr. 8	July 5	84,000
Do	.....	.....	July 29	Sept. 30	40,000
Glen	Sch.	121	Sept. 19c	Mar. 8	5,000
Dora Bluhm	Sch.	315	May 2	Sept. 11	33,000
Newport	S. S.	149	July 4	Aug. 19	125,000
Total	.....	.....	.....	.....	890,632
WASHINGTON.					
Maid of Orleans	Sch.	171	.....	March...	10,000
Ralph J. Long	Sch.	85	June 23	July 5	100,000
Fortuna	Sch.	138	(a)	Apr. 5	20,000
Total	.....	.....	.....	.....	130,000
1907.					
CALIFORNIA.					
W. H. Dimond	Sch.	376	Dec. —d	Jan. 18	103,000
Do	.....	.....	Mar. 20	June 4	292,000
Do	.....	.....	June 21	Oct. 2	60,000
Do	.....	.....	Oct. 31	.....	.....
Hunter	Sch.	60	Sept. 20d	Sept. 30	50,000
Czarina	Sch.	218	Jan. 24	Mar. 27	130,000
Do	.....	.....	Apr. 20	July 19	177,665
Do	.....	.....	Aug. 22	Nov. 9	174,286
Rosie H	Sch.	69	(a)	June 27	45,000
Glen	Sch.	121	Apr. 13	June 10	85,000
Do	.....	.....	Aug. 25	(e)	.....
Total	.....	.....	.....	.....	1,116,951
WASHINGTON.					
Maid of Orleans	Sch.	171	Apr. 2	July 30	98,000
Do	.....	.....	Aug. 29	.....	169,000
Fortuna	Sch.	138	Mar. 15	May 15	40,000
Do	.....	.....	May 27	Oct. 1	95,000
Total	.....	.....	.....	.....	402,000
1908.					
CALIFORNIA.					
W. H. Dimond	Sch.	376	Jan. 28	Mar. 22	80,000
John D. Spreckles	Sch.	253	Mar. 13	June 20	205,000
Do	.....	.....	July 23	Oct. 19	80,000
Repeat	Sch.	410	Apr. 18	July .9	In ballast
City of Papeete	Bkn.	370	Oct. 9	.....	.....
Czarina	Sch.	218	Dec. 12f	Mar. 7	92,903
Do	.....	.....	Apr. 2	July 11	186,500
Ivy	Sch.	135	Mar. 19	May 15	100,000
Ida McKay	Sch.	178	Apr. 6	June 18	150,000
Do	.....	.....	July 11	Sept. 22	100,000
John F. Miller	Sch...	170	Nov. 23f	(g)	.....
Total	.....	.....	.....	.....	994,403
WASHINGTON.					
Maid of Orleans	Sch...	171	.....	Mar. 8	65,000
Do	.....	.....	Sept. 24	Nov. 22	87,000
Total	.....	.....	.....	.....	152,000

a Wintered in the North.
b Lost Apr. 11, 1906.
c 1905.
d 1906.
e Lost Sept. 30, with 28,000 fish.
f 1907.
g Wrecked Jan. 8, 1908.

OPERATIONS OF THE TRANSPORTING FLEET BY YEARS—Continued.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Number of fish brought.
1909.					
CALIFORNIA.					
City of Papeete	Bkn.	370	Sept. 3	Oct. 29	155,000
John D. Spreckles	Sch.	253	Dec. 5[a]	Feb. 21	44,000
W. H. Dimond	Sch.	376	Mar. 15	May 12	105,000
Czarina	Sch.	218	Oct. 9[a]	Feb. 25	125,000
Stanley	Sch.	253	Apr. 26	June 25	272,361
Ida McKay	Sch.	178	Mar. 30	June 14	65,000
Dora Bluhm	Sch.	315	.....	July 8	85,000
Do	.....	.....	.....	Sept. 26	16,000
San Buena Ventura	Sch.	171	.....	Nov. —	30,000
Total	.....	.....	.....	.....	897,361
WASHINGTON.					
Regular steamers	.....	.....	(b)	(b)	13,000
1910.					
CALIFORNIA.					
John D. Spreckles	Sch.	253	Nov. 10[c]	Mar. 9	90,000
Do	.....	.....	Mar. 25	May 31	90,000
Do	.....	.....	June 13	Oct. 3	130,000
Stanley	Sch.	253	Oct. 17[c]	(d)	.....
Czarina	Sch.	218	June 13	Aug. 16	120,600
Do	.....	.....	Apr. 7	May 31	160,000
Do	.....	.....	Oct. 7	Nov. 24	90,000
Total	.....	.....	.....	.....	680,600
WASHINGTON.					
Regular steamers	.....	.....	(b)	(b)	2,875
1911.					
CALIFORNIA.					
John D. Spreckles	Sch.	253	Oct. 31[c]	Mar. 17	131,000
Do	.....	.....	Apr. 9	June 20	169,000
Do	.....	.....	July 16	Sept. 25	103,000
City of Papeete	Bkn.	370	Oct. 4	Dec. 7	55,000
Galilee	Sch.	328	May 20	July 27	251,000
Czarina	Sch.	218	Jan. 15	(f)	.....
Sequoia	Sch.	324	Aug. 14	Oct. 10	200,000
Ottillie Fjord	Sch.	247	Sept. 25	Dec. 8	.....
Total	.....	.....	.....	.....	909,000
WASHINGTON.					
Bender Bros	Sch.	96	Apr. 20	June 6	75,000
Regular steamers	.....	.....	(b)	(b)	8,000
Total	.....	.....	.....	.....	83,000
1912.					
CALIFORNIA.					
Vega	Sch.	233	Oct. 20[g]	Jan. 17	152,000
Sequoia	Sch.	324	Mar. 31	July 1	276,984
John D. Spreckles	Sch.	253	Apr. 7	Apr. 27	150,000
Bertha Dolbeer	Sch.	230	Apr. 6	June 27	30,000
John D. Spreckles	Sch.	253	May 29	Aug. 29	135,000
Sequoia	Sch.	324	July 27	Oct. 6	210,000
Bertha Dolbeer	Sch.	230	.....	Nov. 17	7,000
Total	.....	.....	.....	.....	960,984
WASHINGTON.					
Regular steamers	.....	.....	(b)	(b)	36,950

[a] 1908.
[b] Various dates.
[c] 1909.
[d] Wrecked Mar. 28, 1910.
[e] 1910.
[f] Lost Feb. 15, 1910.
[g] 1911.

OPERATIONS OF THE TRANSPORTING FLEET BY YEARS—Continued.

Name of vessel.	Rig.	Net tonnage.	Date of sailing.	Date of return.	Number of fish brought.
1913.					
CALIFORNIA.					
Galilee	Sch.	328	Nov. 11[a]	Jan. 11	190,847
Sequoia	Sch.	324	Mar. 29	May 30	240,000
Golden State	Sch.	223	Aug. 15	Oct 13	175,000
John D. Spreckles	Sch.	253	Jan. 25	(b)	.....
Bertha Dolbeer	Sch.	230	Mar. 8	July 28	52,000
Total					657,847
WASHINGTON.					
Union Jack	Sch.	39	.....	Oct. 29	20,000
Regular steamers	.....	.....	(c)	(c)	126,250
Total					146,250
1914.					
CALIFORNIA.[d]					
City of Papeete	Bktn.	370	Oct. 8[d]	Jan. 25	200,000
Do	.....	.....	Oct. 18	Dec. 21	45,000
Golden State	Sch.	223	Nov. 15[d]	Jan. 15	159,000
Do	.....	.....	Mar. 5	Apr. 20	199,420
Do	.....	.....	May 20	Aug. 4	194,000
Do	.....	.....	Oct. 15	Dec. 20	171,000
W. H. Dimond	Sch.	376	Jan. 9	Jan. 28[e]	.....
Allen A	Sch.	266	Mar. 3	May 27	240,000
Do	.....	.....	June 20	Nov. 2	200,000
Bertha Dolbeer	Sch.	230	Mar. 10	May 27	32,000
Do	.....	.....	July 18	Oct 1	41,000
Total					1,481,420
WASHINGTON.					
Independent stations, regular steamers	.....	.....	(c)	(c)	104,600
1915.					
CALIFORNIA.					
Golden State	Gas. s.	223	Feb. 21	Apr. 12	174,000
Do	.....	.....	May 6	July 1	230,000
Do	.....	.....	Oct. 19	Dec. 15	170,000
Allen A	Sch.	266	Feb. 18	June 2	267,400
Do	.....	.....	June 18	Aug. 15	193,000
Do	.....	.....	Sept. 6	Dec. 22	47,000
Bertha Dolbeer	Sch.	230	Mar. 13	June 2	33,000
Total					1,114,400
WASHINGTON.					
Regular steamers	.....	.....	(c)	(c)	30,100

[a] 1912.
[b] Lost; had 145,000 fish aboard; all lost.
[c] Various dates.
[d] 1913.
[e] Lost.

DISASTERS TO THE FLEET.

Operating as it does in far northern waters, where the dangers to navigation are numerous and the waters are very poorly surveyed and charted, it is a matter for congratulation that so few disasters have been recorded as occurring to the fleet. The following table, which is not claimed to be complete, shows the total wrecks of which it was possible to find a record. No account is taken of the many

minor accidents to the fleet, of partial disablements, groundings, etc., some of which proved very costly to the owners, however.

RECORD OF WRECKS OF CODFISH VESSELS FROM 1877 TO 1915, INCLUSIVE.

Name.[a]	Owner and home port.	Where wrecked.	Date.	Lives lost.	Codfish lost.
Brontes	——, San Francisco		1877		
Sarah	Lynde & Hough, San Francisco.		1879		
Nagay [b]	McCollam & Co., Alaska	Popof Island	Summer, 1880		
General Miller	N. Bichard, San Francisco		1882		
H. L. Tiernan	Lynde & Hough, San Francisco.	Shumagin Islands.	1882		
Wild Gazelle	McCollam & Co., San Francisco.		Aug. 19, 1883		
Isabel	Hansen & Anderson, San Francisco.	Foundered at sea	1888	14	
Dashing Wave	Lynde & Hough, San Francisco.	Bering Sea	Apr. 16, 1891		
John Hancock	do		Mar. 7, 1893		
Anna	Alaska Codfish Co., San Francisco.	Bering Sea	1902		
Mary and Ida	do	Unga Island	Feb. 23, 1904		78,000
Pearl	do		1905	30	
Nellie Colman	Seattle & Alaska Codfish Co., Seattle.	At sea	1905	30	
Pirate [b]	Union Fish Co., Alaska	Alaska	1906		
Marion	Alaska Codfish Co., San Francisco.	Sannak Island	Apr. 11, 1906		
Glen	Pacific States Trading Co., San Francisco.	Unimak Island	Sept. 30, 1907	1	28,000
John F. Miller	do	do	Jan. 8, 1908	[c] 10	
Stanley	Union Fish Co., San Francisco.	Sannak Island	Mar. 28, 1910	4	
Czarina	do	Nagai Island	Feb. 15, 1911		
Joseph Russ	Robinson Fisheries Co., Anacortes, Wash.	Chirikof Island	Apr. 21, 1912	1	
John D. Spreckles	Alaska Codfish Co., San Francisco.	Run down off California coast.	Mar. 29, 1913	2	145,000
W. H. Dimond	do	Bird Island	Feb. 3, 1914		
Nonpareil [b]	do	Shumagin Islands.	1915		
Highland Queen		Shumagin Islands.	About Apr. 20		

[a] All schooner rigged, except the *Nonpareil,* which was a power schooner.
[b] Employed in station work.
[c] All frozen to death.

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